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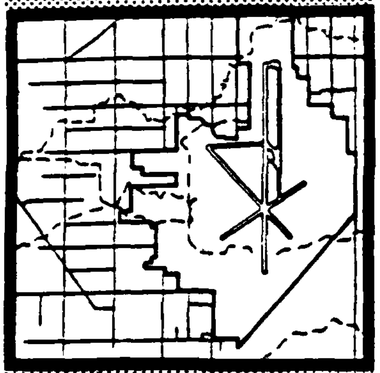

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10395 Old Placerville Road
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SEPTEMBER 1988

SEMIANNUAL INFORMAL TECHNICAL REPORT

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PREPARED FOR:
HEADQUARTERS AFLC/DEV
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United States Air Force
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Technical Services Division (TS)
Brooks Air Force Base, Texas 78235-5501

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DEPARTMENT OF THE AIR FORCE
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1. A final copy of the above mentioned report is attached for your review.

2. This report has been prepared for the United States Air Force for the purpose of aiding in the implementation of a final remedial action plan under the Air Force RI/FS Program. The limited objectives of this report and the ongoing nature of the RI/FS, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this report, since subsequent facts may become known which may make this report premature or inaccurate. Acceptance of this report in performance of the contract under which it was prepared does not mean that the U.S. Air Force or the Department of Defense adopts the conclusions, recommendations, or other views expressed herein, which are those of the contractor only and do not necessarily reflect the official position of either department. The attached Radian report has been reviewed as a matter involved in litigation and has been approved for release to the general public. The report does not contain privileged information.

3. If you have any questions or comments, please contact Jerry Robbins, SM-ALC/EMI, (916) 643-1250.

Paul G. Brunner

PAUL G. BRUNNER
Deputy Director
Environmental Management

1 Atch
Report

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227-005-03
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McCLELLAN AFB, CALIFORNIA

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SEMIANNUAL INFORMAL TECHNICAL REPORT

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HEADQUARTERS AFLC/DEV

WRIGHT-PATTERSON AFB, OHIO 45433

SEPTEMBER 1988

Prepared by:

Radian Corporation
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Sacramento, California 95827

USAF CONTRACT NO.: F33615-87-D-4023, DELIVERY ORDER NO. 03
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USAFOEHL Technical Services Division (TS)
Jerald E. Styles, 1st Lt., USAF, BSC
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United States Air Force
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NOTICE

This report has been prepared for the United States Air Force for the purpose of aiding in the implementation of a final remedial action plan under the Air Force Installation Restoration Program (IRP). As the report relates to actual or possible releases of potentially hazardous substances, its release prior to an Air Force final decision on remedial action is in the public interest. The limited objectives of this report and the ongoing nature of the IRP, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this report, since subsequent facts may become known which may make this report premature or inaccurate. Acceptance of this report in performance of the contract under which it was prepared does not mean that the U.S. Air Force or the Department of Defense adopts the conclusions, recommendations, or other views expressed herein, which are those of the contractor only and do not necessarily reflect the official position of either department.

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This Semiannual Informal Technical Report summarizes the interpretive results for analytical and hydrologic data obtained during groundwater sampling and analysis activities at McClellan AFB from August 1979 through the First Quarter 1988. The data are used to evaluate the occurrence and migration of groundwater contaminants, to assess the variability in the sampling and analytical processes, to identify any hydrologic and analytical trends developing with time, and to evaluate the effectiveness of the Area D extraction system.

The occurrence and migration of TCE in the groundwater was evaluated. Several factors controlling the direction of contaminant flow and the rate of contaminant migration were discussed. These include the effects of pumping by active base production wells and the Area D extraction wells.

Radian was able to quantify sampling variability for three compounds (trichloroethene, 1,1-dichloroethene, and 1,1-dichloroethane). Due to data limitations, seasonal and analytical variability could not be quantified at this time.

An evaluation of the Area D extraction system was conducted. Based on evaluation of analytical and hydrologic data, it is possible to conclude that the extraction system is extracting contaminated groundwater and influencing groundwater flow directions in all three monitoring zones in Area D and off base in the Northwest Area.

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PREFACE

Radian Corporation is the contractor for the Installation Restoration Program (IRP) Phase II/IVA, Stage 3 Remedial Investigation/Feasibility Study (RI/FS) at McClellan Air Force Base (AFB), California. The work is being performed for the USAF Occupational and Environmental Health Laboratory (USAFOEHL) under USAF Contract No. F33615-87-D-4023.

This Final Copy of the Semiannual Informal Technical Report presents the interpretations of data obtained during the Quarterly Sampling and Analysis Program up to and including the First Quarter 1988. The data evaluated include analytical results for groundwater samples collected from monitoring and extraction wells and groundwater-level data measured from wells on and in the vicinity of McClellan AFB. These data were used to evaluate the effectiveness of current interim remedial measures, and to identify trends developing with time.

Key Radian project personnel were:

Nelson Lund - Contract Program Manager
Jack D. Gouge' - Delivery Order Management
Morey Lewis - Project Manager
Tyler P. Thompson - Project Director

Radian acknowledges the cooperation of the McClellan AFB Office of Environmental Management. In particular, Radian acknowledges the assistance of Mr. Mario Ierardi, Mr. Bud Hoda, and Mr. Gerald Robbins.

The work presented herein was accomplished between 1 April 1988 and 12 September 1988. Lt. Jerald E. Styles was the Technical Program Manager.

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EXECUTIVE SUMMARY

This Semiannual Informal Technical Report summarizes the interpretive results for analytical and hydrologic data obtained during groundwater sampling and analysis activities at McClellan AFB from August 1979 through the First Quarter 1988. The data are used to evaluate the occurrence and migration of groundwater contaminants, to assess the variability in the sampling and analytical processes, to identify hydrologic and analytical trends developing with time, and to evaluate the effectiveness of the Area D extraction system.

Analytical data compiled by previous USAF contractors and Radian were used to evaluate the occurrence and migration of groundwater contaminants, specifically chlorinated hydrocarbons (trichloroethene, tetrachloroethene, 1,1-dichloroethene, 1,2-dichloroethane, 1,1-dichloroethane, 1,1,1-trichloroethane, vinyl chloride, chloroform, and carbon tetrachloride). These are the most prevalent contaminants commonly detected in wells located on and in the vicinity of McClellan AFB. Based on evaluation of these data, the predominant factors influencing the migration of contaminants are the physical and chemical characteristics of the aquifer materials and the extraction of groundwater by on-base production and extraction wells and off-base water supply wells. Groundwater flow and contaminant migration is governed locally by the operation of these wells within the study area.

Statistical analyses of analytical results for field and laboratory duplicates were performed to assess total (sampling and analytical) variability. Only data collected from the Fourth Quarter 1985 through the First Quarter 1988 were used for these analyses. This is the only period for which data have been validated by adequate QA/QC and for which consistent and regular sampling of monitoring wells has occurred. Based on a number of field duplicate pairs, sampling (total) variability can be expressed confidently as a relative percent difference (RPD) for three contaminants (trichloroethene, 1,1-dichloroethene, and 1,1-dichloroethane). Analytical variability, a component within sampling variability, cannot be quantified with any statistical significance because of the number of laboratory duplicate pairs is too small. During previous quarters, laboratory duplicates were chosen at random by the laboratory. As a result, the majority (75 to 100 percent) of the wells that were chosen for laboratory duplicate analysis contained no detectable concentrations of contaminants and could not be included in the sample of data points. This severely limited the sample size for this analysis. In the future, laboratory duplicates will be chosen prior to the start of sampling activities to ensure that duplicate analyses are performed on wells containing detectable concentrations of contaminants. Nested duplicates (field duplicates and laboratory duplicates for the same well) will also be chosen so that analytical variability can be quantified as a component of total variability.

Concentrations of TCE for two different quarters, Second Quarter 1986 and First Quarter 1988, were plotted to evaluate any trends of lateral contaminant migration. Concentration contours were also estimated to visually aid in detecting lateral movement. Comparison of these maps did not show any significant changes in contaminant concentration over the seven quarter period, indicating contaminant movement in the horizontal direction is slow.

Analyses of analytical and hydrologic data were also performed to: 1) assess whether the variation in concentrations of contaminants could be directly attributed to seasonal factors; 2) to determine if the analytical data were normally distributed; 3) to determine the effectiveness of the Area D Extraction System by evaluating trends in analytical and hydrologic data collected from wells located in Area D and off-base in the Northwest Area.

Several approaches were used to determine whether variability associated with seasonal factors could be quantified. If there is any seasonal variability in network wells, the effect is masked by other factors. Several factors may be masking the seasonal trend analysis. These include the relatively short period for which data have been collected, the influences on contaminant concentrations as a result of implementation of the interim remedial measure in Area D, and potential sources of recharge throughout the base that may be continually flushing contaminants through the unsaturated zone regardless of seasonal precipitation.

The primary limitation in the seasonal trend analysis is the short period for which validated data are available (Fourth Quarter 1985 to First Quarter 1988). In addition, the two years for which data are available were two very non-normal precipitation years. There was extremely high precipitation in 1986 and extremely low precipitation in 1987. No consistent trends were observed in the analysis of the available data; however, several wells were identified for future assessment of seasonal effects because their analytical results show a possible beginning of cyclic patterns.

Normality testing for groups and individual monitoring wells was conducted to determine whether standard parametric statistics could be applied to the monitoring well results for assessment of trends or patterns in contaminant concentrations. Several parameters were calculated and evaluated, including coefficients of Skewness and Kurtosis, the 'W' statistic, and probability plots. The results for the monitoring wells show a large proportion of zero, or "not detected" values and a few high values. This type of skewed distribution is non-normal. Log transformations of the results were also tested for normality and did not yield a lognormal distribution. The conclusion of the normality testing is that parametric statistical methods cannot be applied to the monitoring well results and that non-parametric or geostatistical methods should be evaluated as potentially valid interpretation tools.

Observed trends in hydrologic and analytical data collected from wells located in Area D and the Northwest Area were evaluated to determine the effectiveness of the Area D extraction system. Based on analyses of the available data, it is possible to conclude that the six Area D extraction wells are removing contaminated groundwater and are influencing local groundwater flow directions in the shallow, middle, and deep monitoring zones. In a little more than a year that the system has been operating, the concentrations of most contaminants detected in monitoring wells in Area D and in the North-

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west Area have been reduced by 70 to 100 percent. Several of the monitoring wells no longer contain contaminants at concentrations exceeding state and federal drinking water standards. On the basis of the apparent decreasing concentration trends, further decreases in contaminant concentrations are expected to occur as the system continues to operate.

Recommendations

Based on the analyses presented in this report, Radian has made several recommendations regarding sampling of additional non-network monitoring wells. These wells are located in Areas A and B and should aid in the evaluation of contaminant migration from Area A towards base production well BW-18.

Several data limitations are recognized throughout this report. Specific recommendations to address these data limitations are not included in this report since other RI/FS activities (specifically, the Hydrogeologic Assessment and Groundwater Pathways tasks) currently planned for the future will address many of these limitations. The Hydrogeologic Assessment Workplan is currently being reviewed by the USAF.

1.0 INTRODUCTION

This is the first of a series of semiannual informal technical reports to present an interpretation of analytical and hydrologic data obtained from the McClellan AFB Quarterly Groundwater Sampling and Analysis Program. Each semiannual report will focus on answering specific questions concerning the magnitude and extent of groundwater contamination, the effectiveness of existing remedial measures, and contaminant trends that may be developing with time.

This report presents interpretative results of the Quarterly Sampling & Analysis Program data collected from August 1979 through the First Quarter 1988. Interpretations focus on groundwater quality data as well as groundwater flow directions and gradients, the geology and hydrology on and off base, and past waste storage and disposal practices.

This report also presents the results of integrated data analysis and interpretation techniques developed to evaluate analytical data collected during the McClellan AFB Quarterly Groundwater Sampling and Analysis Program through the First Quarter 1988. The objective of the analysis is to identify and quantify any trends or patterns in groundwater contamination on and in the vicinity of the base. The results of this directed study can then be related to the integrated RI/FS that is currently being conducted.

The data in this semiannual informal technical report are from two main sources: Radian data (Fourth Quarter 1985 through First Quarter 1988) and pre-Radian data (pre-1985). The statistical analysis and contaminant migration analysis were performed on data collected and validated by Radian. Pre-Radian data was not used in these analyses because quality assurance practices of previous contractors are not documented. Radian's policy is to use data that have been validated through appropriate quality/quality assurance practices. However, to evaluate the historical occurrence of contaminants, pre-Radian was used. This was necessary because many of these wells have gone dry and could not be sampled by Radian in 1985.

The procedures used for assuring the quality of the data are included in each quarterly report. In general, all validated data have been subjected to quality control samples and analyses such as reagent blanks, field blanks, equipment blanks, duplicate samples, and duplicate analyses. Ambient blanks and trip blanks were first collected during the Fourth Quarter 1987. Appropriate reports for individual data can be referenced by the date accompanying most individual data. The data for each quarter were assessed for accuracy, precision, comparability, and completeness, in accordance with standard practice.

The integrated data analysis used hydrogeologic information, statistical methods, and information about current and past solvent storage and disposal areas to define groundwater contamination patterns, and also to identify limitations in the data. Existing geologic cross sections, water-level data, and potentiometric surface maps were used in the analysis of the extent of water quality contamination by area. The data analysis techniques described in this report include the determination of sampling and analytical variability, initial examination of seasonal effects on contaminant concentrations, normality testing, and development of well "clusters" based on geographic, hydrogeologic, and known outside factors (i.e., production and extraction well-pumping), that may influence contaminant levels. Limitations inherent in the data collected to date during the Quarterly Sampling and Analysis Program are also discussed. These limitations include the relatively short period of sampling for most wells (up to two years), and spatially and temporally discontinuous data.

Section 2.0 of this report presents the physiographic and hydrologic background information. Relevant geologic and hydrologic data from studies conducted by previous USAF contractors, Radian, and state and federal agencies were used in developing this section.

Section 3.0 of this report presents factors that are important to groundwater contaminant distribution and migration, including physical properties of the aquifer and contaminants and activities on and off base. In addition, this section presents the distribution of contaminants in each area and the influence of specific factors on the movement of contaminants.

Section 4.0 presents sampling and analytical variability. The section presents the methods used to determine sampling and analytical variability, and the significance of that variability.

Section 5.0 of this report presents seasonal variability, normality, of the data, and an evaluation of the effectiveness of the Area D extraction system.

Section 6.0 presents recommendations based on review of the available analytical and hydrologic data.

In 1976, the U.S. Department of Defense (DOD) developed the comprehensive Installation Restoration Program (IRP). The purpose of the IRP is to assess and control the migration of environmental contamination that may have resulted from past operations and disposal practices at DOD facilities.

Since the initiation of the IRP, significant experience has been gained in all phases of the program, and the approaches used in the IRP have evolved accordingly. Based on experience at USAF bases nationwide, the USAF has adopted an approach that streamlines and integrates the elements of the program. The integrated IRP approach, which incorporates Phase II with the initial stages of Phase IV, is now referred to as Phase II/IVA (RI/FS).

Groundwater sampling and analysis activities include Phase II/IVA (RI/FS) studies, long-term monitoring, and interim remedial action monitoring. In the spring of 1986, as part of the U.S. EPA Site Mitigation Strategy, McClellan AFB announced plans to implement an interim remedial measure to provide municipal drinking water for approximately 500 residences in an area west of the base. The hookups of municipal drinking water were completed in June 1987.

1.1 Study Area and Time Period of Interest

The study area for the Quarterly Sampling and Analysis Program has been divided into 10 geographic areas, which are illustrated in Figure 1-1. Five areas are located on-base and five are located off-base. Areas designated are for the purposes of discussion and are not intended to imply formal boundaries.

On-Base Areas

Four general areas of adversely affected groundwater quality have been identified in and adjacent to historical on-base waste disposal and storage sites identified as Areas A, B, C, and D during the Phase I Installation Restoration Program studies. However, until formal boundaries have been established, monitoring wells that are located close to areas A, B, C, and D are designated as being within an "Adjacent On-Base Area" of Areas A, B, C, and D and are grouped with the wells located within one of the four recognized areas. On-base wells that do not occur close to or within one of the four areas are grouped under "Other On-Base Areas" for convenience of discussion. However, the grouping does not imply that the compounds detected in "Other On-Base Areas" have been traced to any particular source.

The five geographic on-base areas are as follows:

- Area A and Adjacent On-Base Areas;
- Area B and Adjacent On-Base Areas;
- Area C and Adjacent On-Base Areas;
- Area D and Adjacent On-Base Areas; and
- Other On-Base Areas.

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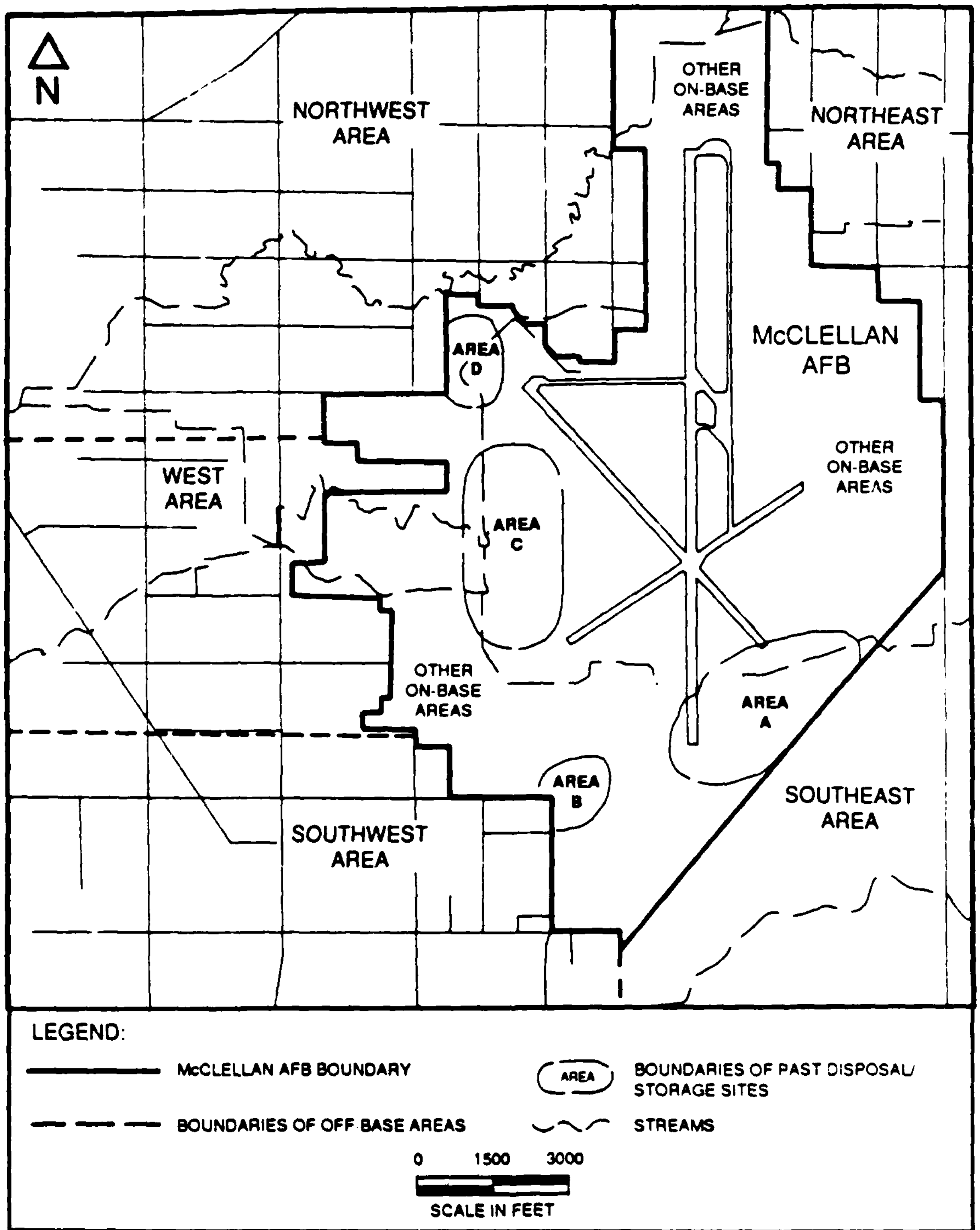

Figure 1-1. Ten Geographic Designations of the Study Area

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Off-Base Areas

The five geographic off-base areas were also chosen to group the groundwater network monitoring wells for convenience of discussion and are not meant to infer that groundwater contaminants detected within their boundaries have been traced to any particular source. The five geographic off-base areas are:

- Northeast Area;
- Northwest Area;
- West Area;
- Southwest Area; and
- Southeast Area.

Time Period of Interest

Analytical data have been compiled from available technical reports provided by previous USAF contractors and have been useful in determining the detected extent of contamination in the recent past. However, only groundwater quality data collected by Radian since the Fourth Quarter 1985 have been used for statistical analyses. This is because adequate QA/QC is verifiable for this period of sample collection and because the majority of monitoring wells have been sampled continuously since this quarter.

1.2 Groundwater Monitoring Network

The McClellan AFB groundwater monitoring network was established in late 1985 as part of the IRP program. The groundwater monitoring network includes 129 wells (85 on base and 44 off base). Decisions on the wells to be included in the network were made cooperatively by Radian, United States Air Force Occupational and Environmental Health Laboratory (USAFOEHL), McClellan AFB Environmental Management Office, and concerned regulatory agencies (Radian, 1987).

Table 1-1 lists the McClellan AFB groundwater monitoring network wells in the 10 geographic areas. The locations of network wells and other wells are shown on Plate 1, located at the end of this report. Well-specific data for network monitoring wells and extraction wells are included in Tables 1-2 and 1-3, respectively.

All on-base monitoring wells have been assigned numbers less than 1,000. All off-base monitoring wells, with four exceptions, have been assigned numbers greater than or equal to 1,000. The four exceptions are MW-28D and MW-28S, located in the Southeast Area, and MW-74 and MW-76, located in the Northwest Area.

TABLE 1-1. GROUNDWATER MONITORING NETWORK, McCLELLAN AFB

	Area A and Adjacent On-Base Areas	Area B and Adjacent On-Base Areas	Area C and Adjacent On-Base Areas	Area D and Adjacent On-Base Areas	Other On-Base Areas
129 TOTAL NETWORK WELLS					
59 Total Shallow Zone Monitoring Wells					
41 Total Middle Zone Monitoring Wells					
29 Total Deep Zone Monitoring Wells					
ON-BASE MONITORING WELLS (85 Total Wells)					
Shallow Zone Monitoring Wells (38 Total Wells)	MW-67, MW-68	MW-41S, MW-120	MW-20S[a], MW-21S, MW-22S[a], MW-33S, MW-34S[a], MW-36S, MW-44S, MW-45S[a], MW-60, MW-61, MW-62, MW-107, MW-110, MW-111, MW-114, MW-128, MW-131, MW-139	MW-10, MW-11, MW-12, MW-14, MW-15, MW-19S[a], MW-88, MW-89, MW-90, MW-91, MW-92	MW-31S, MW-101, MW-116, MW-102, MW-106
Middle Zone Monitoring Wells (26 Total Wells)	MW-27D, MW-69, MW-71	MW-23D, MW-121	MW-20D, MW-21D, MW-75, MW-108, MW-113, MW-115, MW-129, MW-135	MW-52, MW-53, MW-54, MW-55, MW-57, MW-70, MW-72	MW-17D, MW-18D, MW-24D, MW-29D, MW-100, MW-103
Deep Zone Monitoring Wells (21 Total Wells)		MW-63, MW-122, MW-132	MW-22D, MW-109, MW-133, MW-134, MW-136, MW-137, MW-112, MW-130, MW-138, MW-140, MW-141, MW-142, MW-143	MW-51, MW-58, MW-59, MW-104, MW-105	

(Continued)

TABLE 1-1. (Continued)

Southeast Area		Southwest Area		West Area		Northwest Area		Northeast Area
OFF-BASE MONITORING WELLS (44 Total Wells)								
Shallow Zone Monitoring Wells (21 Total Wells)								
MW-1013	MW-1037	MW-1011	MW-1021	MW-1017	MW-1033	MW-1002	MW-1019	MW-1012
MW-1014		MW-1016	MW-1023	MW-1018	MW-1036	MW-1004	MW-1026	
		MW-1020				MW-1005	MW-1029	
						MW-1009	MW-1041	
Middle Zone Monitoring Wells (15 Total Wells)								
MW-28D	MW-1038	MW-1000	MW-1022	MW-1032	MW-1034	MW-74	MW-1027	
		MW-1015	MW-1024			MW-76	MW-1030	
						MW-1003	MW-1042	
						MW-1010		
Deep Zone Monitoring Wells (8 Total Wells)								
MW-1039		MW-1025		MW-1035		MW-1001	MW-1031	MW-1040
						MW-1028	MW-1043	

[a] Well not sampled during Second Quarter 1988 because well was dry.

MW = Monitoring well.

NOTE: The letters "S" and "D" associated with monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.

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TABLE 1-2. WELL SPECIFIC DATA FOR NETWORK MONITORING WELLS ON LOCATED AND IN THE VICINITY OF McCLELLAN AFB

Well Number[a]	Well Depth (ft bgs)[b]	Ground Surface Elevation (ft msl)[c]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[b]	Bladder Pump Depth (ft bgs)[b]	Purge Pump Intake (ft bgs)[b]
10	105.0	62.18	4.0	PVC Sch 40	PVC Sch 40	95-105	NI	NI
11	105.0	60.13	4.0	PVC Sch 40	PVC Sch 40	95-105	NI	NI
12	105.0	61.26	4.0	PVC Sch 40	PVC Sch 40	95-105	NI	NI
14	105.0	64.77	4.0	PVC Sch 40	PVC Sch 40	95-100	NI	NI
15	105.0	65.62	4.0	PVC Sch 40	PVC Sch 40	95-100	NI	NI
17D	130.0	72.99	4.0	PVC Sch 40	SS	120-130	NI	NI
18D	145.0	69.50	4.0	PVC Sch 40	SS	135-145	144	139
19S	87.0	58.84	4.0	PVC Sch 40	SS	77-87	NI	NI
19D[d]	149.0	58.84	4.0	PVC Sch 40	PVC Sch 40	139-149	NI	NI
20S	90.0	60.37	4.0	PVC Sch 40	SS	80-90	NI	NI
20D	155.0	60.37	4.0	PVC Sch 40	SS	150-155	149	140
21S	88.0	54.70	4.0	PVC Sch 40	SS	78-88	87	NI
21D	133.0	54.70	4.0	PVC Sch 40	SS	123-133	132	127
22S	87.0	59.84	4.0	PVC Sch 40	SS	77-87	NI	NI
22D	163.5	59.84	4.0	PVC Sch 40	SS	153.5-163.5	162	144
23D	159.0	58.10	4.0	PVC Sch 40	SS	149-159	158	150
24D	159.0	58.00	4.0	PVC Sch 40	SS	149-159	157	146
27D	148.0	72.22	4.0	PVC Sch 40	SS	138-148	NI	NI

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.
[b] Bgs = Below ground surface.
[c] Msl = Mean sea level.
[d] MW-19D is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.
[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

(Continued)

2088/091088/HMM

TABLE 1-2. (Continued)

Well Number[a]	Well Depth (ft bgs)[b]	Ground Surface Elevation (ft msl)[c]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[b]	Bladder Pump Depth (ft bgs)[b]	Purge Pump Intake (ft bgs)[b]
28D	130.0	72.92	4.0	PVC Sch 40	SS	120-130	NI	NI
29D	147.0	68.60	4.0	PVC Sch 40	SS	137-147	146	141
31S	102.0	65.80	4.0	PVC Sch 40	SS	82-102	NI	NI
33S	97.0	58.02	4.0	PVC Sch 40	SS	87-97	96	NI
34S	88.0	58.17	4.0	PVC Sch 40	SS	78-88	NI	NI
36S	92.0	56.80	4.0	PVC Sch 40	SS	82-92	91	NI
41S	110.0	64.00	4.0	PVC Sch 40	SS	100-110	109	NI
44S	93.0	53.70	4.0	PVC Sch 40	SS	83-93	92	NI
45S	90.0	60.64	4.0	PVC Sch 40	SS	80-90	NI	NI
51	192.0[e]	63.89	6.0	Steel	SS	177-192	190	142
52	157.0[e]	59.14	6.8	Steel	SS	147-157	156	139
53	141.0[e]	64.21	7.6	Steel	SS	130-140	139	134
54	155.0[e]	60.34	6.8	Steel	SS	142-152	151	144
55	145.0[e]	66.52	7.2	Steel	SS	134-144	143	136
57	148.0	64.49	6.8	Steel	SS	137-147	146	132
58	187.0[e]	59.83	6.2	Steel	SS	172-182	181	140
59	179.0	57.68	6.2	Steel	Steel	164-174	173	165
60	107.0	58.87	6.2	Steel	Steel	92-102	101	95
61	111.0	59.70	6.2	Steel	Steel	96-106	105	99

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.
[b] Bgs = Below ground surface.
[c] Msl = Mean sea level.
[d] MW-19D is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.
[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

(Continued)

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TABLE 1-2. (Continued)

Well Number[a]	Well Depth (ft bgs)[b]	Ground Surface Elevation (ft msl)[c]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[b]	Bladder Pump Depth (ft bgs)[b]	Purge Pump Intake (ft bgs)[b]
62	113.0	57.94	8.2	Steel	Steel	98-108	NI	NI
63	179.0	62.98	8.2	Steel	Steel	164-174	171	149
67	115.0	71.62	6.2	Steel	Steel	100-110	109	103
68	131.0	71.77	6.2	Steel	Steel	116-126	NI	NI
69	180.0	70.35	8.2	Steel	Steel	150-170	169	153
70	142.0[e]	60.14	6.2	Steel	Steel	127-137	136	131
71	141.0	73.10	8.2	Steel	Steel	120-136	NI	NI
72	136.0[e]	62.58	4.1	Steel	Steel	121-131	130	124
74	141.0	54.61	6.2	Steel	Steel	126-136	NI	NI
75	130.0	58.16	8.2	Steel	Steel	115-125	NI	NI
76	148.0	53.77	6.2	Steel	Steel	134-144	NI	NI
88	111.0	57.54	4.0	Steel	Steel	96-106	105	NI
89	113.0	59.11	4.0	Steel	Steel	98-108	107	NI
90	111.0	61.06	4.0	Steel	Steel	96-106	105	NI
91	107.0	56.15	4.0	Steel	Steel	92-102	101	NI
92	109.0	55.61	4.0	Steel	Steel	94-104	103	NI
100	174.8	78.94	4.0	SS/PVC	SS	164.8-174.8	174	157
101	119.5	78.27	4.0	SS/PVC	SS	109.5-119.5	119	NI
102	117.0	80.93	4.0	SS/PVC	SS	107-117	16	NI

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.
[b] Bgs = Below ground surface.
[c] Msl = Mean sea level.
[d] MW-190 is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.
[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

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2088/091088/HMM

TABLE 1-2. (Continued)

Well Number[a]	Well Depth[b] (ft bgs)	Ground Surface Elevation[c] (ft msl)	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth[b] (ft bgs)	Bladder Pump Depth[b] (ft bgs)	Purge Pump Intake[b] (ft bgs)
103	143.8	81.76	4.0	SS/PVC	SS	133.8-143.8	143	138
104	181.0	57.22	4.0	SS/PVC	SS	171-181	80	137
105	178.5	58.20	4.0	SS	SS	168.5-178.5	178	137
106	90.0	53.97	4.0	SS/PVC	SS	80-90	89	NI
107	90.0	51.97	4.0	SS/PVC	SS	79-90	89	NI
108	141.3	51.66	4.0	SS/PVC	SS	131.3-141.3	140	128
109	175.9	51.56	4.0	SS/PVC	SS	165.6-175.9	179	138
110	95.0	49.85	4.0	SS/PVC	SS	85-95	94	NI
111	99.5	50.04	4.0	SS/PVC	SS	89.5-99.5	99	94
112	168.0	49.94	4.0	SS/PVC	SS	158-168	167	128
113	125.0	50.43	4.0	SS/PVC	SS	115-125	138	133
114	90.5	53.82	4.0	SS/PVC	SS	80.5-90.5	90	NI
115	140.2	54.06	4.0	SS/PVC	SS	130.2-140.2	139	134
116	94.2	54.89	4.0	SS/PVC	SS	84.2-94.2	93	NI
120	105.0	62.22	2.0	SS/PVC	SS	95-105	104	NI
121	150.0	62.22	2.0	SS/PVC	SS	140-150	149	NI
122	208.0	62.42	2.0	SS/PVC	SS	198-208	207	NI
128	99.4	59.41	4.0	SS/PVC	SS	84.4-99.4	98	NI
129	137.8	59.46	4.0	SS/PVC	SS	127.8-137.8	137	129

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.
[b] Bgs = Below ground surface.
[c] Msl = Mean sea level.
[d] MW-19D is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.
[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

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TABLE 1-2. (Continued)

Well Number[a]	Well Depth (ft bgs)[b]	Ground Surface Elevation (ft msl)[c]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[b]	Bladder Pump Depth (ft bgs)[b]	Purge Pump Intake (ft bgs)[b]
130	189.0	59.21	4.0	SS/PVC	SS	179-189	188	144
131	99.5	59.18	4.0	SS/PVC	SS	84.5-99.5	99	NI
132	218.3	62.51	4.0	SS/PVC	SS	208.3-218.3	217	151
133	260.0	57.94	4.0	SS/PVC	SS	217-227, 237-247	215	116
134	185.0	58.38	4.0	SS/PVC	SS	165-175	156	116
135	130.0	57.94	4.0	SS/PVC	SS	109-119	108	116
136	255.0	57.77	4.0	SS/PVC	SS	230-245	235	116
137	182.0	58.24	4.0	SS/PVC	SS	162-172	159	116
138	254.3	60.44	4.0	SS/PVC	SS	210-220	205	116
139	121.0	56.65	4.0	SS/PVC	SS	100-110	101	111
140	200.0	56.58	4.0	SS/PVC	SS	180-190	177	116
141	245.0	56.55	4.0	SS/PVC	SS	230-240	224	116
142	180.0	57.46	4.0	SS/PVC	SS	160-170	158	116
143	193.0	59.40	4.0	SS/PVC	SS	173-183	171	116
1000	138.0	58.53	4.0	SS/PVC	SS	128-138	137	131
1001	166.5	51.25	4.0	SS/PVC	SS	156.5-166.5	165	129
1002	92.5	56.65	4.0	SS/PVC	SS	82.5-92.5	92	NI
1003	139.0	51.28	4.0	SS/PVC	SS	129-139	138	131
1004	92.5	51.62	4.0	SS/PVC	SS	82.5-92.5	91	NI

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.
[b] Bgs = Below ground surface.
[c] Msl = Mean sea level.
[d] MW-19D is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.
[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

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2Q88/091088/MMM

TABLE 1-2. (Continued)

Well Number[a]	Well Depth (ft bgs)[b]	Ground Surface Elevation (ft msl)[c]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[b]	Bladder Pump Depth (ft bgs)[b]	Purge Pump Intake (ft bgs)[b]
1005	90.0	51.26	4.0	SS/PVC	SS	80-90	89	NI
1009	92.5	57.82	4.0	SS/PVC	SS	82.5-92.5	91	NI
1010	148.0	51.63	4.0	SS/PVC	SS	138-148	147	131
1011	95.4	54.75	4.0	SS/PVC	SS	85.4-95.4	94	NI
1012	107.0	78.64	4.0	SS/PVC	SS	97-107	106	NI
1013	99.0	57.34	4.0	SS/PVC	SS	89-99	98	NI
1014	105.5	66.47	4.0	SS/PVC	SS	95.5-105.5	104	NI
1015	141.0	59.54	4.0	SS/PVC	SS	131-141	140	134
1016	105.5	56.34	4.0	SS/PVC	SS	95.5-105.5	104	NI
1017	90.0	51.80	4.0	SS/PVC	SS	80-90	89	NI
1018	99.0	47.51	4.0	SS/PVC	SS	89-99	98	NI
1019	91.0	45.05	4.0	SS/PVC	SS	81-91	90	NI
1020	106.7	57.82	4.0	SS/PVC	SS	96.7-106.7	106	NI
1021	110.6	63.24	4.0	SS/PVC	SS	100.6-110.6	110	NI
1022	158.4	63.13	4.0	SS/PVC	SS	148.4-158.4	157	151
1023	116.5	52.96	4.0	SS/PVC	SS	106.5-116.5	115	NI
1024	146.5	53.04	4.0	SS/PVC	SS	136.5-146.5	145	139
1025	196.5	53.65	4.0	SS/PVC	SS	186.5-196.5	195	146
1026	101.5	59.57	4.0	SS/PVC	SS	91.5-101.5	100	NI

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.
[b] Bgs = Below ground surface.
[c] Msl = Mean sea level.
[d] MW-19D is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.
[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

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TABLE 1-2. (Continued)

Well Number[a]	Well Depth (ft bgs)[b]	Ground Surface Elevation (ft msl)[c]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[b]	Bladder Pump Depth (ft bgs)[b]	Purge Pump Intake (ft bgs)[b]
1027	140.0	59.53	4.0	SS/PVC	SS	130-140	139	131
1028	188.7	59.40	4.0	SS/PVC	SS	178.7-188.7	185	142
1029	86.8	50.37	4.0	SS/PVC	SS	76.8-86.8	86	NI
1030	158.7	50.17	4.0	SS/PVC	SS	148.7-158.7	158	129
1031	196.0	50.42	4.0	SS/PVC	SS	186-196	195	131
1032	157.9	47.23	4.0	SS/PVC	SS	147.9-157.9	157	131
1033	86.2	48.46	4.0	SS/PVC	SS	76.2-86.2	85	NI
1034	138.7	48.31	4.0	SS/PVC	SS	128.7-138.7	138	130
1035	198.3	48.57	4.0	SS/PVC	SS	188.3-198.3	197	132
1036	74.8	38.60	4.0	SS/PVC	SS	64.8-74.8	74	NI
1037	105.7	62.21	4.0	SS/PVC	SS	95.7-105.7	105	NI
1038	148.2	61.67	4.0	SS/PVC	SS	138.2-148.2	147	142
1039	200.7	61.74	4.0	SS/PVC	SS	190.7-200.7	200	147
1040	206.1	80.01	4.0	SS/PVC	SS	196.1-206.1	205	166
1041	110.9	48.03	4.0	SS/PVC	SS	100.9-110.9	110	104
1042	138.0	47.82	4.0	SS/PVC	SS	128-138	137	129
1043	195.0	47.91	4.0	SS/PVC	SS	185-195	194	129

[a] The letters "S" and "D" associated with the monitoring well numbers are part of the well identification notation and do not refer to monitoring zones at McClellan AFB.

[b] Bgs = Below ground surface.

[c] Msl = Mean sea level.

[d] MW-19D is a non-network monitoring well. This well is sampled every other quarter and therefore, was included in this table.

[e] Well casing was extended during construction of the Area D cap. The depth shown is referenced to the top of the earthen cap and not to the original ground surface.

NA = Not available.
NI = Not installed.
SS = Stainless steel.
PVC = Polyvinyl chloride.

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TABLE 1-3. WELL SPECIFIC DATA FOR EXTRACTION WELLS LOCATED ON McCLELLAN AFB, SECOND QUARTER 1988 SAMPLING AND ANALYSIS PROGRAM

Well Number	Well Depth (ft bgs)[a]	Ground Surface Elevation (ft msl)[b]	Casing I.D. (inches)	Casing Material	Screen Material	Screen Interval Intake Depth (ft bgs)[a]	Submersible Pump Depth (ft bgs)[a]
EW-73	164	NA	8.0	Steel	SS	40-160	145
EW-83	172	NA	8.0	Steel	SS	40-160	145
EW-84	170	NA	8.0	Steel	SS	40-160	145
EW-85	170	NA	8.0	Steel	SS	40-160	145
EW-86	170	NA	8.0	Steel	SS	40-160	145
EW-87	170	NA	8.0	Steel	SS	40-160	145

[a] Bgs = Below ground surface.
[b] Msl = Mean sea level.

NA = Not available.
SS = Stainless steel.

McSEMIAN/071588/JKS

2.0 PHYSIOGRAPHIC AND HYDROLOGIC SETTING

McClellan AFB is located near the eastern edge of the Sacramento Valley, an area characterized by low topographic relief. The land surface at McClellan AFB has a slope of about 2 percent from the east to the west. The major drainages in the vicinity are the Sacramento and American rivers. The Sacramento River flows approximately six miles west of the base and the American River is located approximately seven miles to the south.

The Sacramento Valley is a large depositional basin, filled with thick sequences of sediments eroded from the Sierra Nevada to the east and the Coast Range to the west. The north-south trending valley is a synclinal trough (basin) that has been filled with as much as 60,000 feet of sediments. Over 4,000 feet of sediments are estimated to have been deposited in the valley since the Eocene Epoch (about the last 60 million years). These sedimentary deposits are wedge-shaped, with the thickest sediments located near the west side of the valley. Very little structural displacement of the sediments has occurred in the geologic history of this area (California Department of Water Resources, 1974).

The oldest and deepest fresh-water aquifer in the Sacramento area is the Mehrten Formation. The Mehrten Formation, which is Miocene to Pliocene in age, consists of volcaniclastic deposits (predominantly tuff-breccia) inter-bedded with clays. The Tertiary-Quaternary deposits that overlie the Mehrten Formation are also a source of fresh water. In the vicinity of McClellan AFB these deposits include the Victor, Laguna, and Fair Oaks formations.

2.1 Local Geology

2.1.1 Soils

Soil types in the vicinity of McClellan AFB are extremely variable. The surface soils (less than 5 feet deep) are composed of mixed alluvium derived from a variety of sources, mainly granitic rock. Most of the soils have been in place long enough to have developed a silica cementation ("hardpan") at a depth of 20 to 40 inches. Surface textures are predominantly loam and sandy loam, underlain by finer-textured loam and sandy clay loam horizons over the hardpan. Soil permeabilities range from 0.6 to 2.0 inches per year, depending on local conditions. The local soils are generally classified as San Joaquin fine sandy loam, Fiddyment fine sandy loam, or San Joaquin-Xeralfic Arents complex. These soils have a low shrink-swell potential, a slight erosion potential, and a very low available water capacity of approximately 0.10 to 0.14 inches of water per inch of soil. Natural soil conditions may not be represented at McClellan AFB due to excavation and disturbance by past on-base activities.

2.1.2 Geologic Units

As shown in Figure 2-1, the Victor, Fair Oaks, Laguna, Mehrten, and Pre-Mehrten Formations underlie McClellan AFB. These geologic formations are of primary concern for this report because they form fresh-water aquifers accessed by McClellan AFB, and have experienced water quality degradation from on-base sources. Groundwater used by the base is pumped from the Fair Oaks, Laguna and Mehrten formations.

Typical lithologies in the fluvial deposits at McClellan AFB include heterogenous sands, silts, clays and, rarely, gravels in upward-fining sequences that appear to be repeated through the upper 220 feet of the subsurface. The textures range from clean well-sorted sand, to clayey silty sand, to silty clay. Pure clay is very rare. Sand bodies grade laterally to various proportions of silty and clayey sand. The clean, well-sorted sands may occupy subsurface channels, and erosional contacts may be inferred where well-sorted sands occur laterally adjacent to silt or clay. Deposits also grade laterally through various proportions of silt and clay.

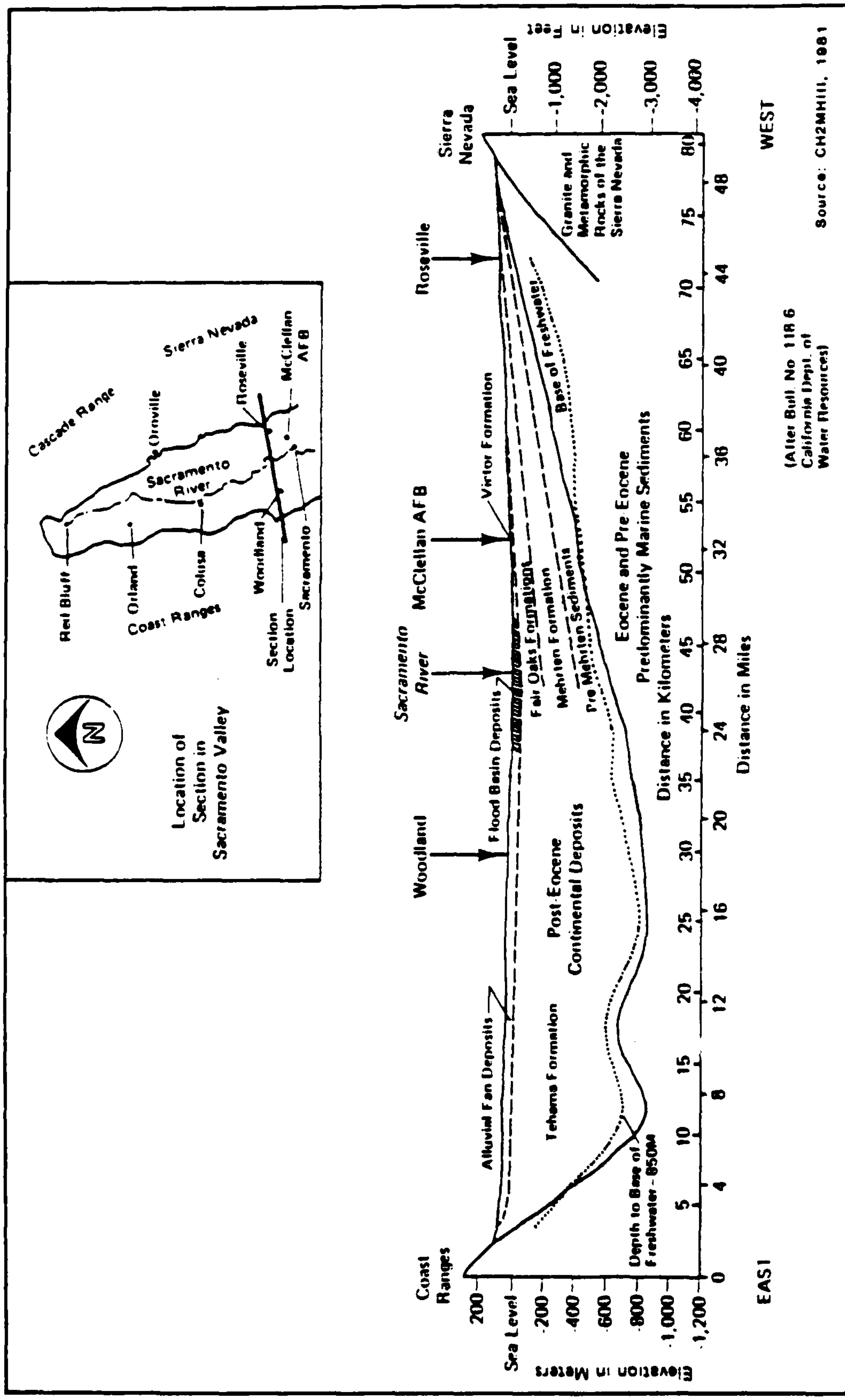

Figure 2-1. Schematic Geologic Cross Section of the Sacramento Valley

0788-046-1

2.2 Local Groundwater Hydrology

The aquifer system beneath McClellan AFB is comprised of a succession of relatively permeable sandy deposits interbedded with less permeable deposits of silt and silty clay. The waterbearing strata above 120 feet are generally unconfined; the waterbearing strata below 120 feet are generally semi-confined. Strata within the unconfined zone and semi-confined zone are believed to be interconnected because of the heterogenous nature of the local sedimentary deposits and the absence of a laterally extensive, low permeability, confining layer. The lateral discontinuity and facies changes within the semi-confining layers allow contaminants to move vertically between the various waterbearing zones.

Near the base, groundwater occurs primarily in the Fair Oaks-Laguna and Mehrten formations. The water table is typically 80 to 110 feet below the ground surface, with seasonal fluctuations of about 2 feet. Groundwater recharge in the eastern portion of the Sacramento Valley occurs as a result of infiltration from streams, rivers, rainfall, and irrigation and runoff from the foothills of the Sierra Nevada. The uppermost waterbearing zone in the Sacramento Valley is recharged by groundwater flow and through percolation of surface water. Groundwater in the deeper waterbearing zones originates in recharge areas in the Sierra Nevada foothills east of McClellan AFB. Groundwater discharge in the Sacramento Valley occurs predominantly through pumping.

The Fair Oaks and Laguna formations have generally low to moderate hydraulic conductivity except where coarse-grained channel deposits are present. In these more permeable materials, well yields may reach 3,500 gallons per minute (GPM), with drawdowns of approximately 30 feet, resulting in a specific capacity of about 120 GPM per foot (GPM/ft) of drawdown (California Department of Water Resources, 1974). The black sands of the Mehrten Formation generally demonstrate a specific capacity of approximately 45 GPM/ft. Specific capacities as high as 100 GPM/ft, however, have been noted in the Mehrten Formation (California Department of Water Resources, 1974).

Radian has defined three monitoring zones based on the elevation of monitoring well screens and correlation of geologic logs. These zones were designated to provide control for groundwater-level measurements, to determine horizontal and vertical groundwater gradients, and to monitor the extent of groundwater contamination. Within each of these zones are coarser-grained, high-permeability layers separated by low-permeability layers. Textures of the layers range from well-sorted sands to clayey, silty sand to silty clay.

These zones, designated by elevation and not by separate and distinct hydrogeologic units, are:

- Shallow: above -55 feet mean sea level (msl);
- Middle: between -55 to -100 feet msl; and
- Deep: below -100 feet msl.

With the exception of monitoring wells MW-1023, MW-1041, MW-1030, and MW-1032, wells are assigned to a monitoring zone based on the elevation of the bottom of the well screen. Due to the depth to the water table, relatively low ground surface elevation, and site-specific hydrogeologic conditions, monitoring wells MW-1023 and MW-1041 have been assigned to the shallow monitoring zone even though the bottom of screen elevations are between -55 and -100 feet msl (middle monitoring zone). Although these wells are screened within the middle monitoring zone, MW-1023 and MW-1041 were assigned to the shallow monitoring zone because the first saturated material was encountered at this depth while drilling. Similarly, monitoring wells MW-1030 and MW-1032 were assigned to the middle monitoring zone even though the bottom of screen elevations are below -100 feet msl (deep monitoring zone). These wells were assigned to the middle monitoring zone because the second occurrence of saturated material (typically representing the middle monitoring zone) was encountered below -100 feet msl while drilling.

2.2.1 Aquifer Parameters

Aquifer parameters have been characterized by several methods. Multiple well aquifer tests in which one well is pumped and drawdown is observed in other wells have been conducted in Areas B, C, and D. Single well tests have been conducted in Area A and in various monitoring wells on and off base. A summary of the test results obtained by CH2M Hill, Engineering-Science, McLaren, Radian, and EG&G, Idaho is presented in Table 2-1.

2.2.2 Flow Characteristics

During the early 1900s, groundwater in the vicinity of McClellan AFB moved from areas of recharge in the northeast to areas of discharge in the southwest (Figure 2-2) in response to the natural hydraulic grandient. Since the turn of the century, the local extraction of groundwater for irrigation, industrial, municipal, and domestic use has dramatically altered groundwater levels and gradients. By 1960, groundwater pumping had increased such that the rate of withdrawal began to exceed the rate of recharge, and groundwater levels began to decline. Under these conditions, local horizontal gradients underwent marked changes in direction and magnitude, and local groundwater depressions began to develop in areas of maximum withdrawal. At this time, a major regional pumping depression is approximately centered just south of McClellan AFB, as shown in Figure 2-3. This depression has resulted in a change in the local groundwater flow direction such that flow is now generally to the south, as shown in Figure 2-4.

Monitoring wells have been installed on and in the vicinity of McClellan AFB as shown in Plate 1, located at the end of this report. Currently, groundwater levels in 136 monitoring and extraction wells are measured monthly as part of the Quarterly Groundwater Samplir.g and Analysis Program. Each monitoring well has been grouped into one of the three monitoring zones (shallow, middle or deep) described previously. Groundwater-level measurements from the monitoring wells are used to produce potentiometric surface

TABLE 2-1. SUMMARY OF AQUIFER TEST RESUL EPORTED BY RADIAN AND OTHER CONTRACTORS

Contractor	Monitoring Zone	Transmissivity (gpd/ft) Range	Transmissivity (gpd/ft) Average	Hydraulic Conductivity (gpd/ft^2) Range	Hydraulic Conductivity (gpd/ft^2) Average	Storativity ($x10^{-4}$) Range	Storativity ($x10^{-4}$) Average
Radian (Area C)	Middle	7,700 - 8,600	8,000	260 - 290	270	1.3 - 6.2	3.0
	Deep	7,600 - 15,000	12,000	250 - 500	390	1.6 - 0.87	1.6
CH2M Hill (Area D)	Shallow	17,500 - 28,600	16,525	NR	NR (725)[b]	9.0 - 82.0	40[a]
	Middle	2,300 - 19,300	8,850	NR	NR (315)[b]	3.0 - 11.0	8.0
McLaren (Area D)	Shallow, Middle & Deep	6,851 - 19,110	12,000	NR	NR	5.0 - 91.0	30
Engineering-Science (Area C)	Shallow	21 (one value reported)	21	4.2	4.2	NR	NR
McLaren (Area C)	Middle	1,200 - 1,900		97 - 120	109	ND	
EG&G Idaho, Inc. (Area C)	Middle	13,750 - 3,000	2,500	NR	NR (83)[b]	ND	

[a] Specific yield not reported for unconfined condition in shallow monitor zone.
[b] Hydraulic conductivity estimated by Radian based on reported transmissivity value and aquifer thickness.

NR = Not reported.
ND = Not determined.

SOURCE: CH_2M Hill, August 1984. "Hydrogeologic Evaluation of Area D McClellan AFB, California" IRP Phase IIVIV Tech Memo Number 3.
Engineering-Science, 1983. "Final Report, Installation Restoration Program, Phase II - Confirmation, McClellan AFB, California." Engineering-Science, Arcadia, California.
McLaren Environmental Engineering, January 1986a. "Area D Monitoring/Extraction System, Technical Report No. 2, Testing of Initial Extraction Well and System Confirmation by Computer Modeling," prepared by McLaren Environmental Engineering, Sacramento, California, for McClellan AFB, Sacramento, California, Contract No. F04699-85-C0020.
EG & G Idaho, Inc. "Hydrogeologic Assessment Report for the Surface Impoundment, Area "C", McClellan Air Force Base, Sacramento, California, "Project Number PRJY871509. December 1987.
Radian Corporation, 1986. "Installation Restoration Program, McClellan AFB, California, Phase II, Monitoring Well Installation, Stage 2-2", 3 Volume.

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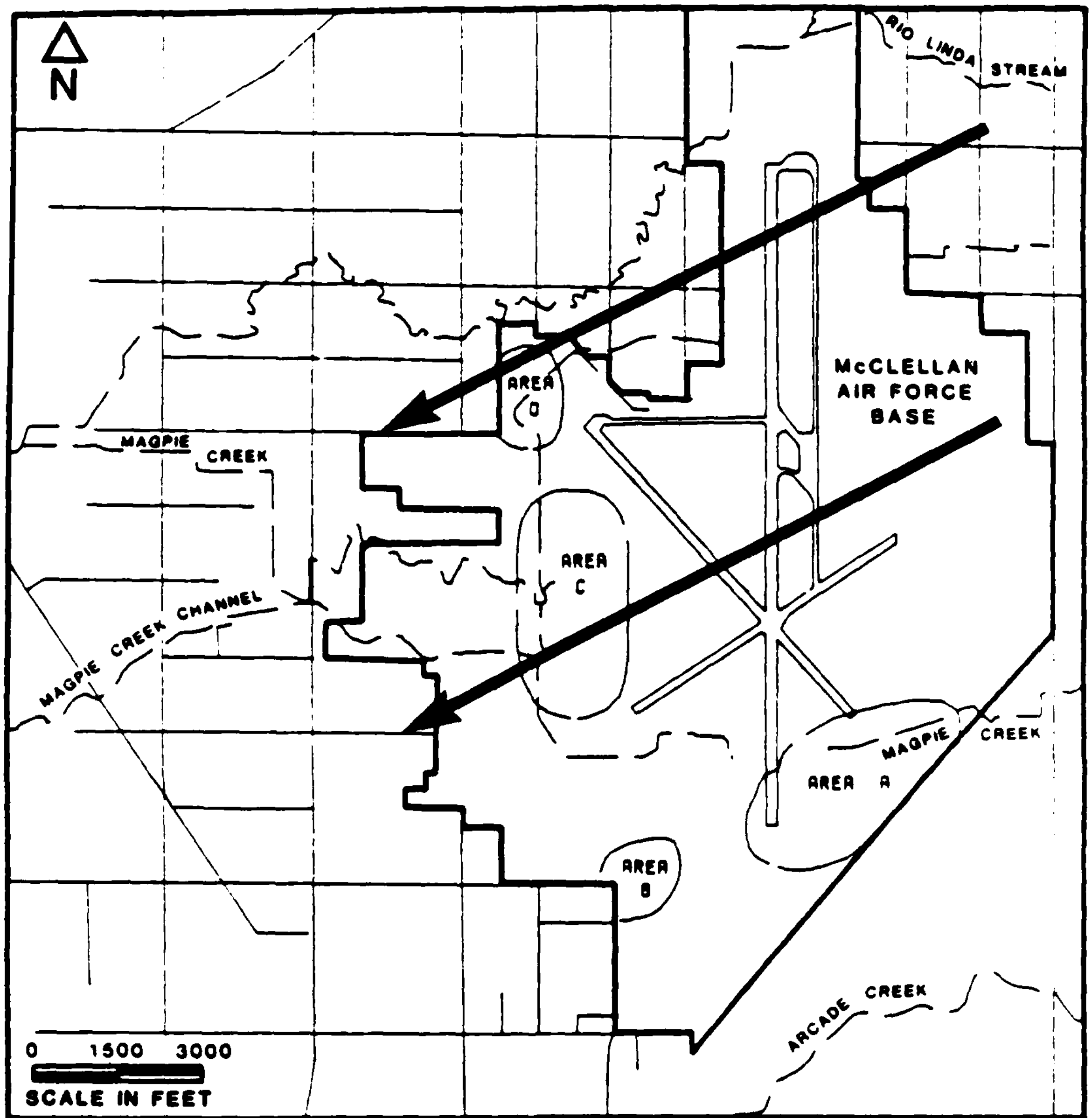

LEGEND:

AREA BOUNDARIES OF PAST DISPOSAL/ STORAGE SITES

STREAMS/CREEKS

McCLELLAN AFB BOUNDARY

FLOW DIRECTION

Figure 2-2. Estimated Groundwater Flow Directions for the Vicinity of McClellan AFB, 1912 (Adapted from Bloyd, 1978)

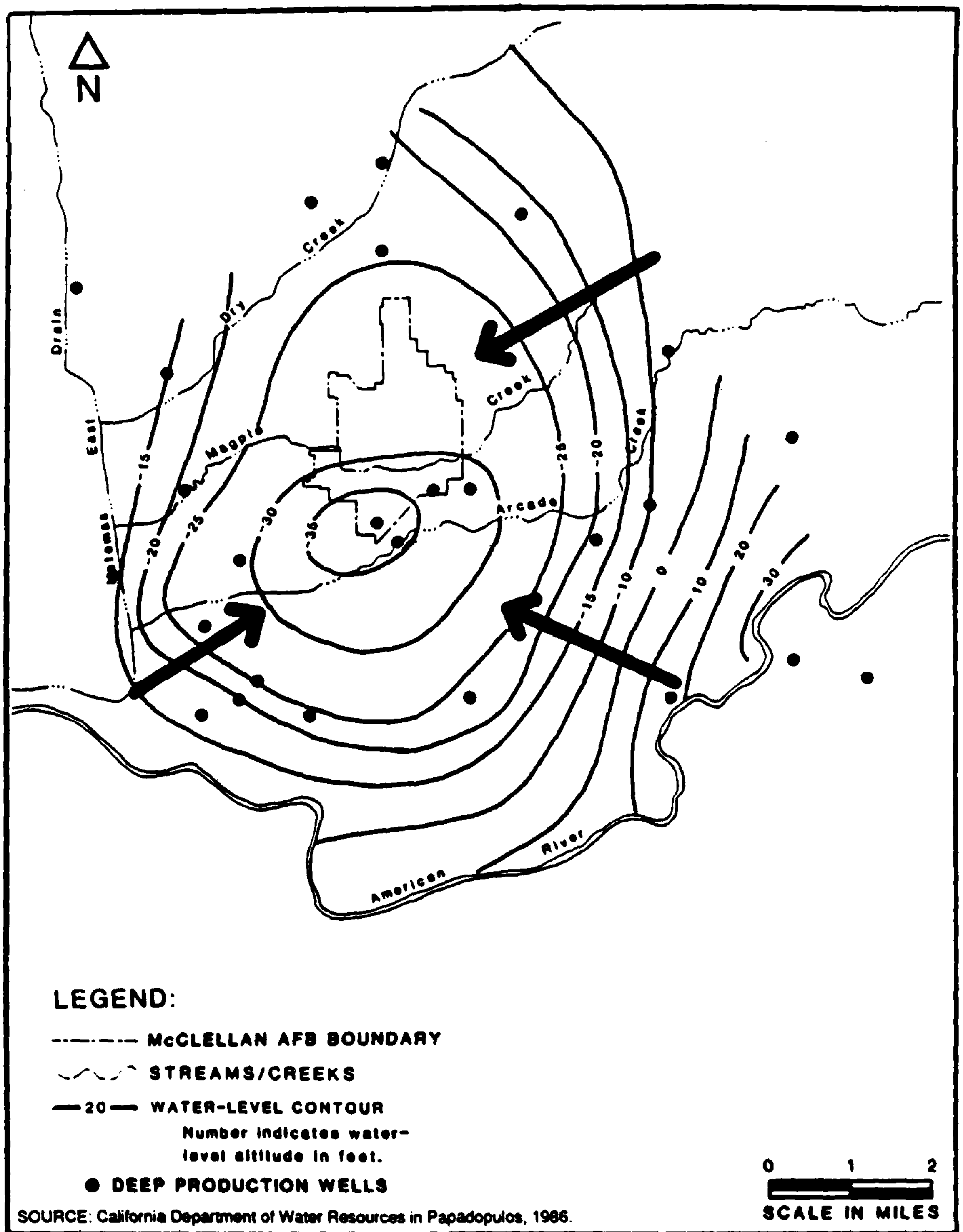

Figure 2-3. Water Level Measurements for Fall 1977 Showing Large Groundwater Depression in the Vicinity of McClellan AFB

0588-040-07

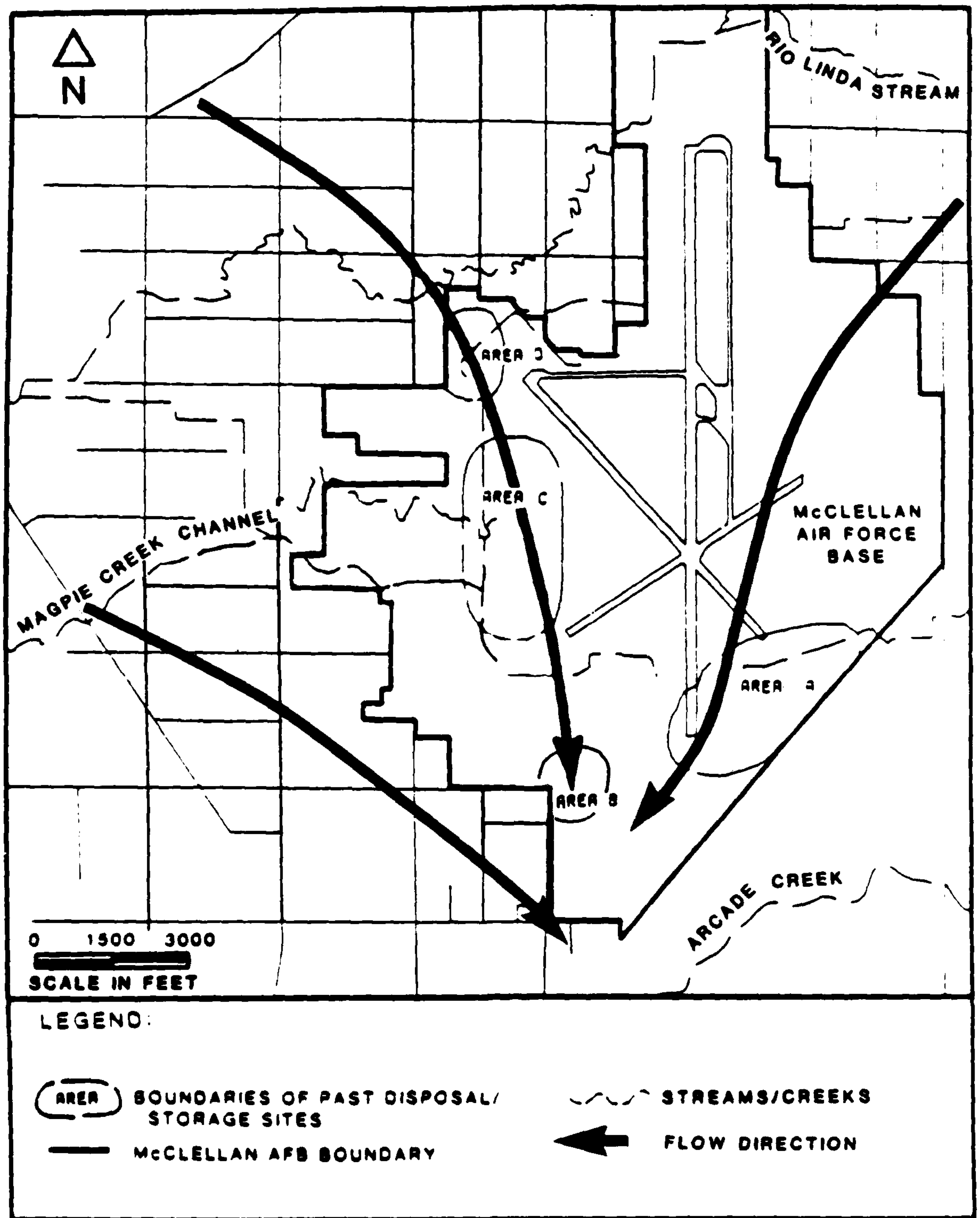

Figure 2-4. Estimated Groundwater Flow Directions for the Vicinity of McClellan AFB, 1985

maps for the three monitoring zones. The potentiometric maps are used to determine groundwater flow directions, including local deviations from the regional flow pattern. Pumping of on-base production wells and extraction wells affects local groundwater flow directions as shown on the potentiometric surface maps for March 1988 (Plates 2, 3, and 4).

The regional groundwater flow direction is to the south-southwest. In the northern end of the base, groundwater flow appears to be toward the south, following the regional trend. However, groundwater flow deviates from this regional flow pattern near the Area D extraction wells and active base production wells. The influence of the Area D extraction system is evident in the northwestern portion of the base. Potentiometric surface maps indicate that the extraction system is restricting groundwater from flowing off base in that area and is inducing groundwater flow toward the Area D extraction wells. In the eastern portion of the base there are several active base production wells (BW-10, BW-20, and BW-29). Groundwater flow in this area is probably influenced by the production wells, but the areal extent of their effect cannot be determined due to the limited of monitoring wells in this area. In the southern portion of the study area, groundwater flow appears to converge towards base production well BW-18. There are other active water supply wells to the south and southwest of the base that may also be influencing flow, but their effect cannot be defined because of the limited number of monitoring wells in this area. The potentiometric surface maps generated from the existing water-level data do show that BW-18 has a strong influence on local groundwater flow.

Over the last six quarters, (Fourth Quarter 1986 to First Quarter 1988), groundwater flow directions appear to have changed in two sections of the study area. In Area D, the direction of groundwater flow was off base to the northwest in all three monitoring zones during the Fourth Quarter 1986. The effect of the Area D extraction system is clearly evident on the potentiometric maps for all three monitoring zones in March 1988 (Plates 2, 3, and 4). Also, in the southern portion of the study area, the influence of

BW-18 can be seen more easily, as additional monitoring wells were added to the network over the past six quarters.

2.2.3 Natural Groundwater Quality

Groundwater quality in the area of the base is naturally excellent for irrigation and domestic uses. The groundwater is characterized as a sodium-calcium or calcium-magnesium bicarbonate type (CH2M Hill, 1981). As determined in Stage 2-1 of the IRP, sodium concentration ranges from about 11 to 53 mg/L, calcium concentration ranges from 9.3 to 35 mg/L, and magnesium concentrations range from 9.1 to 23 mg/L. Total dissolved solids average about 240 mg/L. Average sulfate and nitrate concentrations are approximately 21.6 and 1.9 mg/L, respectively. Specific monitoring zones or geographic areas on base do not exhibit distinctive water-quality characteristics (Radian, 1985).

3.0 CONTAMINANT DISTRIBUTION AND MIGRATION

This section describes the distribution and migration of contaminants beneath McClellan AFB on the basis of the available analytical data for groundwater and the present level of understanding of physical, chemical, and chronologic parameters. Parameters having had a historical and a continuing impact on contaminant concentrations and distribution consist of four basic types:

- Source area (location, size, and content);
- Chemical and physical parameters of contaminant compounds;
- Characteristics of the vadose zone;
- Hydrogeologic characteristics of the saturated zone; and
- Chronologic parameters:
  - the time interval of contaminant release from source areas,
  - travel time through the vadose zone, and
  - the time that a contaminant has traveled toward a water supply or monitoring well in the groundwater.

The following discussion begins with known or potential sources of contaminants and identifies potential migration pathways through the vadose and saturated zones to McClellan AFB monitoring wells. Quantifiable, estimated, and unknown parameters and interactions are described as they relate to the path of migration.

3.1 Potential Sources of Contaminants

Potential sources of contaminants detected in groundwater on McClellan AFB are former waste disposal and chemical storage sites that have been identified in previous and ongoing investigations. Additional potential sources, referred to as Potential Release Locations (PRLs), have been recognized from historical aerial photos and other records. The information available for all PRLs, previously investigated or uninvestigated, is listed in tables in Appendix A. Because investigations of all identified sources and PRLs are not complete at this time, their physical and chronologic parameters and the characteristics of chemical compounds present have not been defined. The following section describes the available information for waste disposal and chemical storage as it relates to contaminant distribution and migration.

3.1.1 Waste Disposal Practices and Chronology

McClellan AFB was established in 1936 and became operational in 1937. The operations at McClellan AFB relate to the management, maintenance, and repair of various aircraft and electronics and communications equipment. These activities, conducted since the base was established in 1936, have required the use of various hazardous and toxic materials. A summary of past waste disposal practices is presented below. The summary was compiled through review of historical data and from published reports by previous USAF contractors.

1940s: Trichloroethene (TCE), other solvents, and oils were burned at a pit in Area C.

1950s to Early 1960s: TCE was distilled on base. Although attempts were made to reuse the chemical on base, the distillation process was ineffective, and TCE wastes were disposed in a burn pit (Disposal Site 22). The burn pit was used in the 1940s, 1950s, and early 1960s and subsequently filled and closed in 1968.

1962 to 1963: A program was initiated to reclaim commingled oils and solvents for sale through the Defense Property Disposal Office (now referred to as the Defense Reutilization and Marketing Office). TCE disposal through oil/solvent reclamation was ineffective because the TCE settled to the bottom of the holding tanks. Segregation of all wastes containing TCE for disposal at the base sludge pits (Disposal Sites 2, 4, 5 7, and 8) then became the standard practice.

1963 to Early 1970s: TCE wastes continued to be disposed of at the sludge pits. However, due to concerns related to air pollution, the use of TCE at the base was significantly reduced and then phased out. Other cleaning solvents, such as tetrachloroethene, trichlorofluoromethane, and 1,1,1-trichloroethane were substituted for TCE.

1976: Solvent disposal at the sludge pits was significantly reduced. Solvents were containerized and transported to off-base state-approved chemical landfills or to reclamation facilities.

Late 1978: The use of TCE on base was banned due to concerns about air pollution.

Early 1981: On-base disposal of industrial wastewater sludge was discontinued. All industrial wastewater sludge was transported off base for disposal at a Class I landfill.

1982 to Present: Waste disposal on base has been restricted to small amounts of demolition debris, treated industrial wastewater, and sewage grit. Private contractors and Sacramento County have collected solid refuse since 1968.

3.1.2 Detection of Contaminants in On-Base Production Wells

Contaminants have been detected historically in water supply wells located on- and off-base. In 1956, base production well BW-7, located in what is now Area A, was found to be contaminated by unspecified hydrocarbons and phenols. The well was subsequently taken out of service. Beginning in 1979, McClellan AFB began studying the groundwater quality problem and developing measures to remediate the problem.

In 1979, base groundwater supplies were found to be contaminated by volatile organic compounds (VOCs). Of principal concern was the presence of TCE (Luhdorff and Scalmanini, 1984). Throughout November 1979, on- and off-base sampling resulted in identification of three areas of TCE contamination. These areas are now designated as Areas A, B, and D. As a result of the initial sampling, three off-base and two McClellan AFB groundwater supply wells (BW-1 and BW-2) were shut down due to volatile organic compound contamination. Two of the three off-base wells are private household wells and the third belongs to the City of Sacramento (CW-150).

The results of the 1983 study (Engineering Science, 1983) indicated the presence of organic compounds (primarily chlorinated hydrocarbons) and trace metals in shallow wells on the base. They concluded that the shallow waterbearing zone (first waterbearing zone in the aquifer) was contaminated, particularly along the western border of the base. TCE concentrations along the western border ranged from 0.54 ug/L in MW-3 to 14,100 ug/L in MW-14. No sources could be readily identified for the contaminants measured in some wells. The levels of most contaminants in samples from the deeper waterbearing units were near or below the analytical limits of detection. Low levels of pesticides and herbicides generally less than 1 ug/L were detected in several on-base production wells including BW-2, BW-8, BW-11, BW-12, and monitoring wells MW-4, MW-7, MW-8, MW-9, MW-10, MW-13, MW-14, and MW-15.

3.1.3 Parameters of Storage, Use, and Disposal Sites

Facilities for storage and disposal of chemicals include drainage ditches, burn pits, landfills, buried leaky wastewater transfer lines, and enclosed structures such as aircraft maintenance hangers, metal plating facilities, and storage warehouses.

Several parameters for each chemical storage, use, and disposal site are important in assessing the site's impact on contaminant migration. They are: the physical location and quantities of chemicals or wastes; the time interval over which a site was used; and the physical and chemical characteristics of the chemicals or wastes. Of the 154 previously identified potential sources of contaminants, 68 have been investigated sufficiently to determine parameters. For the remaining 86 PRLs, only the parameters of location and approximate time of usage are known with some level of confidence from aerial photographs. Investigations which will supply additional parameters are planned for the future.

Most of the PRLs occur near the periphery of McClellan AFB, because the center of the base is dominated by the busy aircraft runways and taxiways. Figure 3-1 illustrates the U-shaped distribution of 46 of the largest storage, use, and disposal sites. The sites are clustered in or near four areas (A, B, C, and D) designated in previous reports. The potential impact of contaminants on groundwater in each of the areas is discussed in Section 3.7.

In determining the distribution of contaminants beneath McClellan AFB, the physical parameters of location and content of each site are important because they affect the point of entry and depth of penetration for contaminants in the subsurface. Unless a chemical use, storage, or waste disposal area is underlain by natural or man-made impervious materials, contaminants will move into the vadose zone. Locations of potential contaminant sources are basically known for McClellan AFB. However, the content in terms of volume or types of materials is not well known. Travel

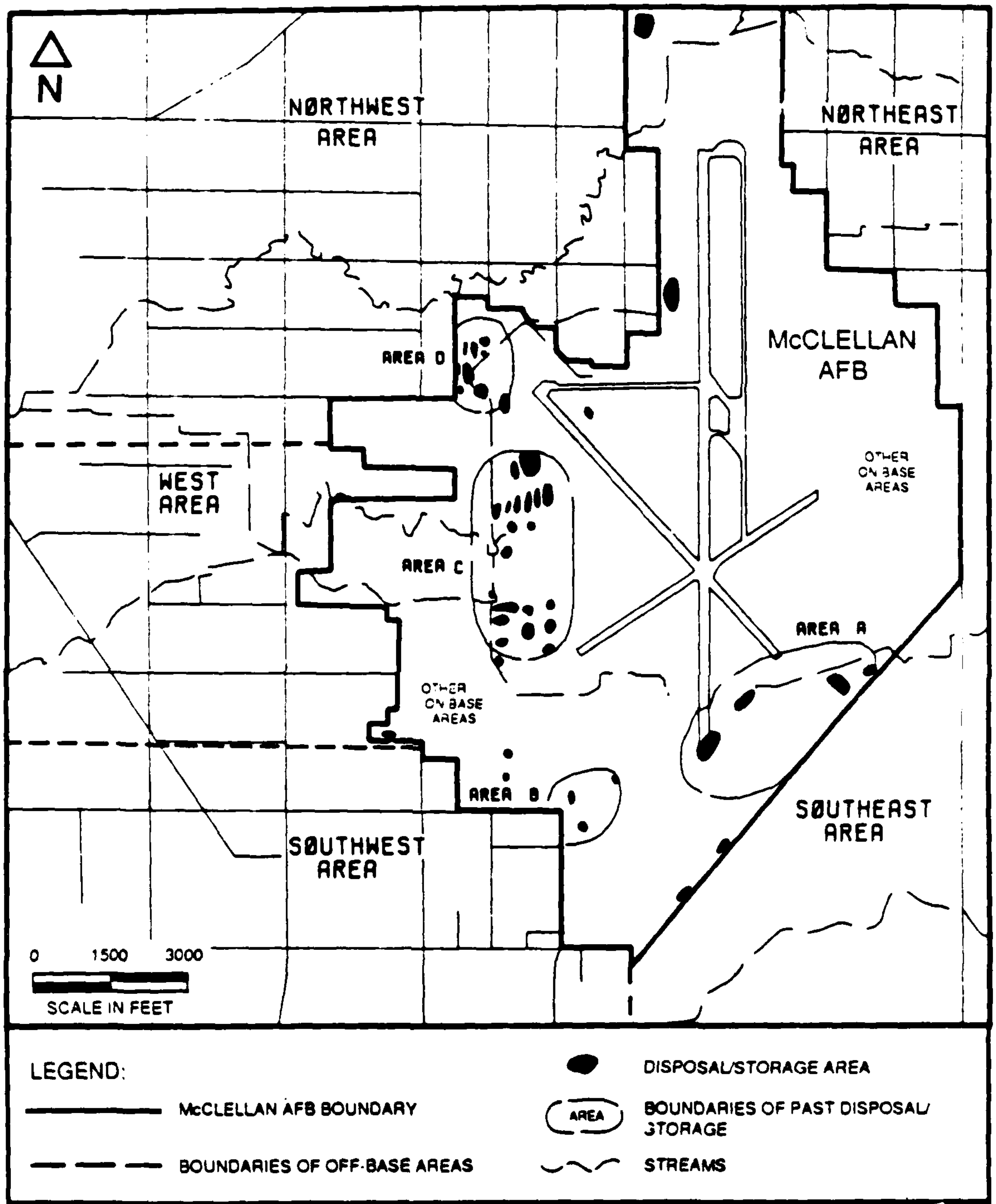

Figure 3-1. U-shaped Distribution of 46 Waste Disposal and Storage Areas at McClellan AFB

SOURCE: Modified from CH2M Hill, 1982.

time to groundwater depends on an understanding of other parameters described in following subsections. Without information on the quantity, type and time of release of materials deposited at potential release areas, the total impact of contaminant release from any one site cannot be determined.

The quantities and nature of contaminants and the depths of migration from PRLs will be better understood as planned site investigations under the preliminary pathways, groundwater pathways, and hydrogeologic assessments are conducted. Investigations of surface soils, site histories, surface water, soil vapor, surface flux and sediment will help to identify and quantify the contaminants of concern. Chemical and physical properties can then be determined and used to characterize contaminant migration.

3.2 Chemical and Physical Parameters of Contaminants

Based on historical use and disposal practices, potential human health risks, and compounds discovered in on-base and off-base groundwater wells, halogenated hydrocarbons, particularly TCE, are recognized as the principal contaminants of concern at McClellan AFB. Halogenated hydrocarbons are man-made organic compounds many of which are produced for use as degreasers and solvents. The halogenated hydrocarbons form a loose grouping of compounds, each of which is distinct in terms of structural formula, but which are similar in terms of density, solubility, viscosity, and volatility. For this and future groundwater investigations on McClellan AFB, the halogenated compounds of primary concern are chloroform ($CHCl_3$), carbon tetrachloride ($CHCl_4$), 1,1-dichloroethane (1,1-DCA), 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethene (1,1-DCE), trichloroethene (TCE), tetrachloroethene (PCE), and any degradation products of those compounds.

Physical and chemical properties for concentrated and dilute forms of organic compounds have been calculated or measured in laboratories. The physical properties affecting migration from source to groundwater include quantity or volume, density, viscosity, adsorption, and partitioning between gas and liquid phases. In addition, solubility in water, degradation by chemical or biogenic processes, reactions with other chemicals, and affinity for natural organic materials (sorption) are important properties that influence movement of contaminants. The importance of the properties or parameters in determining the migration of the organic compounds varies with the nature of the subsurface environment. Some properties play a greater role in the vadose zone, such as partitioning, and others play a greater role in the saturated zone, such as solubility. Table 3-1 lists the principal physical and chemical properties determined for the organic compounds detected in monitoring and water supply wells near McClellan AFB.

Physical and chemical properties influence migration of compounds upon leaving man-made containment. Solubility in water can immediately affect migration toward groundwater, if a compound is discharged with water or exposed to surface water (infiltrating or stormwater runoff). The compound will dissolve in water up to its limit of solubility, given enough time, and move in the subsurface along the migration path of surface water. Each of the compounds of concern at McClellan AFB are considered moderately soluble; they will dissolve in water over a range from 200 mg/L (for PCE) to 8,700 mg/L (for 1,2-DCA) at 20° C. Once in the aqueous phase, a given compound will tend to remain in solution and follow the migration path of water unless other factors change to decrease solubility. The quantity of a compound that cannot be dissolved in water will behave according to the properties of non-aqueous phases.

Halogenated hydrocarbons, including the group of compounds occurring at McClellan AFB, have densities greater than water. Undissolved fractions of a compound will tend to sink through a water body to form a separate chemical phase (Schwille, 1988). The sinking and density separation may occur in surface waters or within an aquifer. The densities of the compounds in Table 3-1 are 0.26 to 0.63 greater than that for water which is 1.0 g/cm^3.

In the vadose zone, the physical properties of contaminants affecting migration are viscosity, partitioning with respect to air, and adsorption on subsurface materials. Viscosity of liquids is the property which resists

TABLE 3-1. PHYSICAL AND CHEMICAL PROPERTIES OF DENSE CHLORINATED SOLVENT COMPOUNDS

Compound	Solubility (mg/L)	K_{oc} (mL/g)	Density (g/cm^3)	Dynamic Viscosity (Centipoise)	Henry's Law Constant (atm-m^3/mol)
Chloroform	8,200	44	1.49	0.56	0.0028
Carbon tetrachloride	785	439	1.59	0.97	0.023
1,1-Dichloroethane	5,500	30	1.17	0.50	0.0043
1,2-Dichloroethane	8,690	14	1.26	0.84	0.00091
1,1,1-Trichloroethane	720	152	1.35	0.84	0.013
1,1-Dichloroethene	400	65	1.22	0.36	0.021
cis-1,2-Dichloroethene	800	--	1.28	0.48	0.0029
trans-1,2-Dichloroethene	600	59	1.26	0.40	0.072
Trichloroethene	1,100	126	1.46	0.57	0.0071
Tetrachloroethene	200	364	1.63	0.90	0.0131

NOTE: Temperature of measurement is 20°C unless otherwise noted.

SOURCE: Schwille, 1984.

relative motion; the higher values of viscosity indicate greater resistance to flow in porous media. The viscosities of the organic compounds in Table 3-1 are less than the viscosity of water. Therefore, the pure or undissolved organic compounds have a greater tendency to flow through pores than does water under the same conditions and is important in the movement of contaminants into and through the unsaturated zone.

Partitioning of a volatile organic compound between liquid and air phases occurs in any environment where the compound is exposed to the air phase. This may occur in the surface environment and in the vadose zone beneath the site of discharge. Partitioning of volatile organics into the air phase may significantly affect the quantity of halogenated hydrocarbons that migrate through the unsaturated zone toward groundwater, because the compounds under conditions in the vadose zone may tend to volatilize. The Henry's Gas Law Constant in Table 3-1 is the parameter representing partitioning of compounds between air and water phases. The constants for the compounds of interest on the base vary over two orders of magnitude. The greater values of the constant indicate greater partitioning to the air phase.

Physical and chemical parameters of organic compounds that especially influence migration of contaminants in the saturated zone are those that affect solid/liquid partitioning of organic compounds. Sorption is the interaction that controls partitioning of an organic compound between solid phases and liquid (Freeze and Cherry, 1979), and is determined by the characteristics of the liquid phase and the solid phase. Sorption of organic compounds to naturally-occurring organic materials in the subsurface is proportional to the octanol-water partition coefficient K_{oc} (Karickhoff, 1984). Higher values of K_{oc} in Table 3-1 indicate a stronger attraction of a compound for natural organic particles or a higher degree of hydrophobility. Organic particle contents as low as 0.1 percent by volume may have a significant effect on the sorption of halogenated organic compounds. Sorption of organic contaminants on natural organic particles will slow or retard the migration of contaminants with respect to groundwater migration velocity (Roberts, Goltz, and Mackay, 1986).

Sorption of organic compounds on non-organic particles is another interaction which may affect contaminant migration velocity. The sorption of organic compounds for non-organic mineral particles may be equal to or greater than the sorption on organic particles if the ratio of mineral surface area to organic particle content is large (Karickhoff, 1984; McCarty, Reinhard, and Rittman, 1981). Subsurface deposits with high clay or silt particle content may retard the velocity of organic compound migration. Although there have been few determinations of organic particle content of the sediments beneath McClellan AFB, laboratory measurements of organic content and grain size analysis of core samples will be made as part of the Groundwater Pathways Assessment.

Degradation of halogenated organic compounds is the alteration of the compound by chemical or biologically-assisted chemical processes. The dehalogenation or removal of chlorine or fluorine atoms may be accomplished chemically through oxidation or hydrolysis (Vogel and McCarty, 1987) or biologically through the activity of microorganisms (McCarty, Rittman, and Bouwer, 1984). Although the dehalogenation process is driven by chemical reaction or biologic activity, the net effect of the process is removal of halogen atoms, thereby altering the chemical character and potentially the migration pattern of the compound.

Dehalogenation as a result of biologic activity may occur in a step-wise manner in which one halogen atom is removed from an organic molecule structure (McCarty, 1986). The step-wise removal of chlorine from a compound such as PCE could alter it first to TCE, to 1,2-DCE, and then to vinyl chloride. One step in the dehalogenation process may take a number of years to become apparent as detectable concentrations of organic compounds in groundwater, and not all of the quantity of one compound may be dehalogenated simultaneously. Therefore, a quantity of PCE discharged in groundwater may result over 30 years in detectable concentrations of the original compound and several of its dehalogenated "daughter" products. Dehalogenation beneath McClellan AFB is indicated by the presence of PCE, TCE, 1,2-DCE, and vinyl chloride in groundwater monitoring wells in the same areas.

3.3 Parameters in the Vadose Zone

Beneath the potential contaminant discharge points of known waste disposal sites and PRLs lies a 90 to 100 foot thick unsaturated zone. The vadose zone beneath McClellan AFB consists of interbedded, alluvial sands, silts, and clays of the Victor and Fair Oaks formations. Deposits in the formations were laid down in a fluvial environment. Fluvial deposition in the Victor and Fair Oaks formations is characterized by gravel and sand filling paleochannels which are long but narrow. Available lithologic data also suggest that the paleochannels migrated laterally and vertically with time. Between the channels, silty to clayey overbank deposits, interfinger with flood-deposited sands and increase in clay content with distance from the channels. Fluvial-interfluvial deposits of the kind recognized beneath McClellan AFB are heterogeneous in their grain size distribution and in their permeabilities.

Permeability, which is the ability of porous medium to allow fluid flow, is an important parameter for determining the pathway for chemical compounds or water from the ground surface. Heterogeneity in permeability results from the processes in which deposits were laid down. Permeability, sometimes termed intrinsic permeability, is the major factor in the calculation of the hydraulic conductivity (K), used in the Darcy equation for groundwater flow. Hydraulic conductivity values characterize the ability of a porous medium to allow flow of a fluid with specific density and viscosity characteristics (Freeze and Cherry, 1979).

Although vertical conductivities primarily affect contaminant migration through the unsaturated zone, other physical parameters are also important. Infiltration of surface water, water content and distribution, capillarity, and soil-air-liquid exchanges also affect movement of liquid contaminants through the vadose zone. However, these parameters cannot be quantified with the available data, but properties of the unsaturated zone will be better characterized from site and pathways investigations.

3.4 Parameters in the Saturated Zone

The saturated zone beneath McClellan AFB lies at a depth of 90 to 100 feet below ground surface where all void spaces in the deposits of the Fair Oaks Formation or the interfingering, contemporaneous Laguna Formation are filled with groundwater. Deposits of these formations have a thickness of approximately 325 feet and occur between depths of 50 and 400 feet below ground surface. All monitoring well samples in which contaminants have been detected are screened within one of these formations. Therefore, the physical properties of these formations play a significant role in determining the contaminant migration velocities in the saturated zone beneath McClellan AFB.

The Fair Oaks and Laguna formations were deposited in the same time interval and under generally similar depositional conditions. As a result of the depositional processes, the deposits in the formations are heterogeneous horizontally and vertically. The nature of the heterogeneity was described in Section 3.3 for the vadose zone. As in the vadose zone, horizontal and vertical variations in grain size distribution result in permeability differences. In the vadose zone, vertical conductivity variations are of primary importance due to the strong gravitational flow component. Horizontal hydraulic conductivity is also an important saturated flow parameter because groundwater has a significant horizontal flow component.

Within porous saturated deposits, hydraulic conductivity (K) may vary in direction and place, as in the heterogeneous deposits beneath McClellan AFB. Variations in K throughout a deposit determine, in part, velocity of groundwater or contaminant flow. Horizontal hydraulic conductivity values have been determined from aquifer tests conducted in several widely-spaced areas of McClellan AFB. The values range from 4.2 to 500 gallons per day per square foot of aquifer (gpd/ft^2). The values and sources of data are listed in Table 3-2.

Vertical hydraulic conductivity for deposits beneath McClellan AFB have indirectly characterized from two different aquifer tests. Vertical K values probably vary over a range at least as large as that for horizontal K values. In many aquifers, vertical conductivity is 10 to 100 times less than horizontal conductivity (Freeze and Cherry, 1979). Vertical conductivities which are 0.1 to 0.01 of horizontal conductivities result from the deposition of laterally continuous beds of sorted particles with finer particles concentrated near the top or the bottom. Relatively low conductivities impede vertical flow of groundwater. Because laterally extensive sorted beds are not typical of the saturated zone beneath the base, vertical hydraulic conductivity locally may be similar or equal to horizontal conductivity. Therefore, groundwater containing contaminants may flow vertically from shallow zones to deeper zones.

In addition to hydraulic conductivity, a significant parameter in determining contaminant migration is hydraulic gradient. Hydraulic gradient as indicated by differences in total hydraulic head determines the potential direction for groundwater flow. In an unpumped aquifer, groundwater flow may follow surface topographic features of a region. Groundwater is pumped from several depths on and near the base, and steep gradients are induced near pumped wells. Previous studies by Bloyd (1978) and Papadopulus and Associates (1986) report that groundwater flow directions have changed from westerly to southwesterly in response to groundwater withdrawals. Within the boundaries of the base, groundwater gradients vary from place to place in response to pumping for groundwater supply (for example, base production well 18) or groundwater remediation (Area D extraction wells).

Changes in groundwater gradients occurring since the disposal of contaminants began at McClellan AFB affect the direction of contaminant migration. Contaminants that have reached the upper groundwater zone over the last 30 years have probably moved with groundwater along flow paths determined

TABLE 3-2. SUMMARY OF AQUIFER TEST RESUL :PORTED BY RADIAN AND OTHER CONTRACTORS

Contractor	Monitoring Zone	Transmissivity (gpd/ft) Range	Transmissivity (gpd/ft) Average	Hydraulic Conductivity (gpd/ft^2) Range	Hydraulic Conductivity (gpd/ft^2) Average	Storativity ($x10^{-4}$) Range	Storativity ($x10^{-4}$) Average
Radian (Area C)	Middle	7,700 - 8,600	8,000	260 - 290	270	1.3 - 6.2	3.0
	Deep	7,600 - 15,000	12,000	250 - 500	390	1.6 - 0.87	1.6
CH2M Hill (Area D)	Shallow	17,500 - 28,600	16,525	NR	NR (725)[b]	9.0 - 82.0	40[a]
	Middle	2,300 - 19,300	8,850	NR	NR (315)[b]	3.0 - 11.0	8.0
McLaren (Area D)	Shallow, Middle & Deep	6,851 - 19,110	12,000	NR	NR	5.0 - 91.0	30
Engineering-Science (Area C)	Shallow	21 (one value reported)	21	4.2	4.2	NR	NR
McLaren (Area C)	Middle	1,200 - 1,900		97 - 120	109	ND	
EG&G *Idaho, Inc.* (Area C)	Middle	13,750 - 3,000	2,500	NR	NR (83)[b]	ND	

[a] Specific yield not reported for unconfined condition in shallow monitor zone.
[b] Hydraulic conductivity estimated by Radian based on reported transmissivity value and aquifer thickness.

NR = Not reported.
ND = Not determi:.ed.

SOURCE: CH_2M Hill, August 1984. "Hydrogeologic Evaluation of Area D McClellan AFB, California" IRP Phase IIVIV Tech Memo Number 3.

Engineering-Science, 1983. "Final Report, Installation Restoration Program, Phase II - Confirmation, McClellan AFB, California." Engineering-Science, Arcadia, California.

McLaren Environmental Engineering, January 1986a. "Area D Monitoring/Extraction System, Technical Report No. 2, *Testing of Initial Extraction Well and System Confirmation by Computer Modeling*," prepared by McLaren Environmental Engineering, Sacramento, California, for McClellan AFB, Sacramento, California, Contract No. F04699-85-C0020.

EG & G Idaho, Inc. "Hydrogeologic Assessment Report for the Surface Impoundment, Area "C", McClellan Air Force Base, Sacramento, California, "Project Number PRJY871509. December 1987.

Radian Corporation, 1986. "Installation Restoration Program, McClellan AFB, California, Phase II, Monitoring Well Installation, Stage 2-2", 3 Volume.

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by gradients induced by groundwater withdrawal. Some on-base and off-base wells have started pumping after a time when contaminants could have entered the groundwater. The direction of contaminant movement in some areas may have changed more than once in response to pumping of water supply wells. Because widespread groundwater monitoring to trace contaminant distribution has begun very recently, the migration paths followed by contaminants under historic gradients cannot be determined accurately. Therefore, hydrogeologic and site history data should be collected during future site investigations and pathway studies to characterize present flow paths and to evaluate possible remediation measures.

Dispersion and seasonal variations in groundwater levels also have an impact on the concentration of contaminants. Dispersion is the spreading and mixing of contaminants in directions both along and normal to the general direction of groundwater flow. Factors contributing to dispersion include aquifer heterogeneities, mixing due to variations in groundwater velocities in and between pores, and molecular diffusion (Freeze and Cherry, 1979). These properties result in contaminants spreading over a larger volume of the saturated zone than would be caused by mechanical transport by flowing groundwater. Dispersivity values for a contaminant in a saturated zone may have different values for the direction parallel to groundwater flow and the direction transverse to the direction of flow. The net result of dispersion is the lowering of contaminant concentrations by dilution. Dispersivity values are scale dependent and thus are not readily measured. Dispersivity for a specific area can be determined through field tests.

Seasonal variations in water elevations for the saturated zone may reflect two different effects on contaminant concentrations in groundwater. An increase in water levels during or following the wetter winter months of the year may cause a decrease in contaminant concentrations at some wells due to dilution of the concentration of contaminant by the increased volume of uncontaminated water. On the other hand, contaminant concentrations may increase locally in wetter seasons because infiltrating rainfall or losses from surface streams, due to greater runoff, may "flush" contaminants into the saturated zone from pore spaces in the vadose zone where they have been held during dry seasons. Although the extent of these opposing effects cannot be fully evaluated for McClellan AFB because of local variations in the vadose zone, seasonal changes in contaminant concentrations of monitoring wells can be assessed with a data base that includes enough quarterly data.

3.5 Chronologic Parameters

The principal time-related factors affecting contaminant distribution in groundwater beneath McClellan AFB are the time of contaminant release, travel time through the vadose zone, and travel time in the saturated zone toward a water supply or monitoring well.

The time interval of contaminant releases from PRLs may be estimated from historic data and aerial photographs of the base. Specific dates or years of contaminant release cannot be determined from the data, but a range of five years before or after the time of release may be estimated.

The travel time through the vadose zone depends on the physical characteristics of the medium, rainfall infiltration, and the characteristics of the contaminants as discussed above. Future planned site investigations of PRLs shall yield data for this type of analysis.

The travel time for a contaminant depends not only on when contaminants reach the groundwater but also on the variations in groundwater flow directions over time. Once in the groundwater, contaminants tend to follow groundwater flow directions that are locally affected by withdrawals from water supply wells. In the period that contaminants may have reached and begun to migrate with groundwater, new on-base and off-base water supply wells have been installed. Pumping of various water supply wells, both on- and off-base have changed hydraulic gradients locally. Therefore, a contaminant moving in one direction in groundwater 20 years ago, for example, may have changed direction ten years ago due to the change in gradient induced by a new well. This change in flow direction complicates the tracking of contaminant migration pathways.

3.6 Distribution of Contaminants

The previous sections describe the physical parameters that influence movement of contaminants and groundwater beneath McClellan AFB. The principal purpose for defining and quantifying the parameters is to estimate the distribution of contaminants throughout the groundwater domain beneath the base and nearby areas. Based on this understanding, potential degradation of groundwater supplies and methods to remediate the degradation may be addressed. As discussed above in the previous sections, a number of important parameters are not yet sufficiently known to estimate contaminant distribution. The ongoing RI/FS activities including the Quarterly Sampling and Analysis Program, the Hydrogeologic Assessment for McClellan AFB, and Pathways studies may provide more information on the nature and relative volume of contaminants, distribution of contaminants in the groundwater, surface soils and underlying deposits, effects of water supply wells, and timing of potential releases.

Contaminant distribution in any specific area is characterized by the volume of the saturated zone through which contaminants have spread from one or more sources. The volume affected is determined by the lateral and vertical distances over which contaminants have been transported. Travel distance is ultimately determined by product of velocity (speed and direction) and travel time. The distribution of contaminants in the groundwater beneath McClellan AFB cannot be quantitatively predicted at this time because the parameters affecting speed of travel (for example, effective porosity, horizontal and vertical hydraulic conductivities, retardation caused by sorption, hydraulic gradients, and direction of travel (flow direction, permeability), and travel time through the vadose zone are not accurately known. Therefore, estimation of contaminant distribution depends on the distribution monitoring wells, the ability of analytical techniques to detect contaminants in samples, and the use of analytical techniques to interpret sample results and hydrogeologic information.

The McClellan AFB Quarterly Sampling and Analysis Program is the investigative method available to determine the distribution of contaminants in groundwater. The following subsections describe the efforts to define contaminant distribution on the basis of data compiled from the program.

3.7 Distribution and Migration of Contaminants by Area

The following discussion of contaminant distribution and migration is based primarily on sampling results from monitoring wells located on and off base. In addition, other factors that may have influenced contaminant distribution are also considered. Figures 3-2, 3-3, and 3-4 show the location of shallow, middle, and deep zone monitoring wells that have contained any of nine contaminants (1,1-DCE, 1,1-DCA, TCE, vinyl chloride, chloroform, 1,2-DCA, 1,1,1-TCA, carbon tetrachloride, and tetrachloroethene). These figures were generated from analytical data collected during the period from 1981 through the First Quarter 1988 from all monitoring wells. Monitoring wells are not uniformly distributed across the McClellan AFB study area but are clustered primarily in and around Area D and the south end of Area C. As shown in Figure 3-2, contamination in the shallow monitoring zone has predominantly been detected in on-base Areas A, B, C and D and off-base in the Southwest, the Northwest, and the West Areas. Middle zone contamination, as shown in Figure 3-4, is similar to the shallow monitoring zone. Contaminants in the deep monitoring zone have been detected in Areas B, C and D but there are no wells in Area A. Radian has recommended that additional wells be installed in and around Areas A and B to determine water quality.

Analyses of groundwater samples collecteu from the wells across the base have indicated the presence of a variety of contaminants. During the First Quarter 1988, TCE was detected in Area A, Area B, Area C, Area D, the Northwest Area, the West Area and the Southwest Area. Detected concentrations of chlorinated solvents and several metals (chromium and lead) were at or

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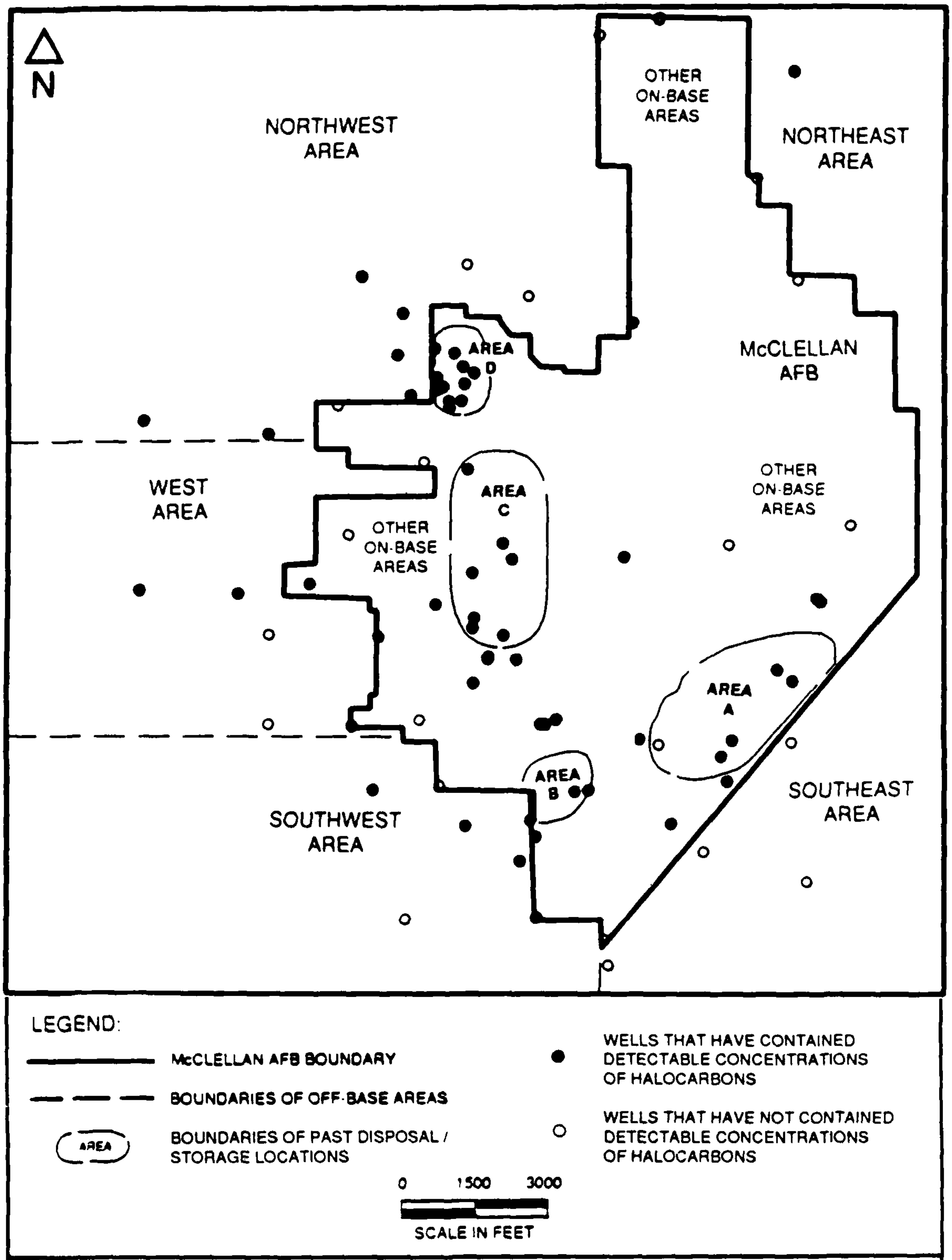

Figure 3-2. Locations of Shallow Monitoring Zone Wells that Have Contained Any of Nine Commonly Detected Halocarbons (1981 to First Quarter 1988)

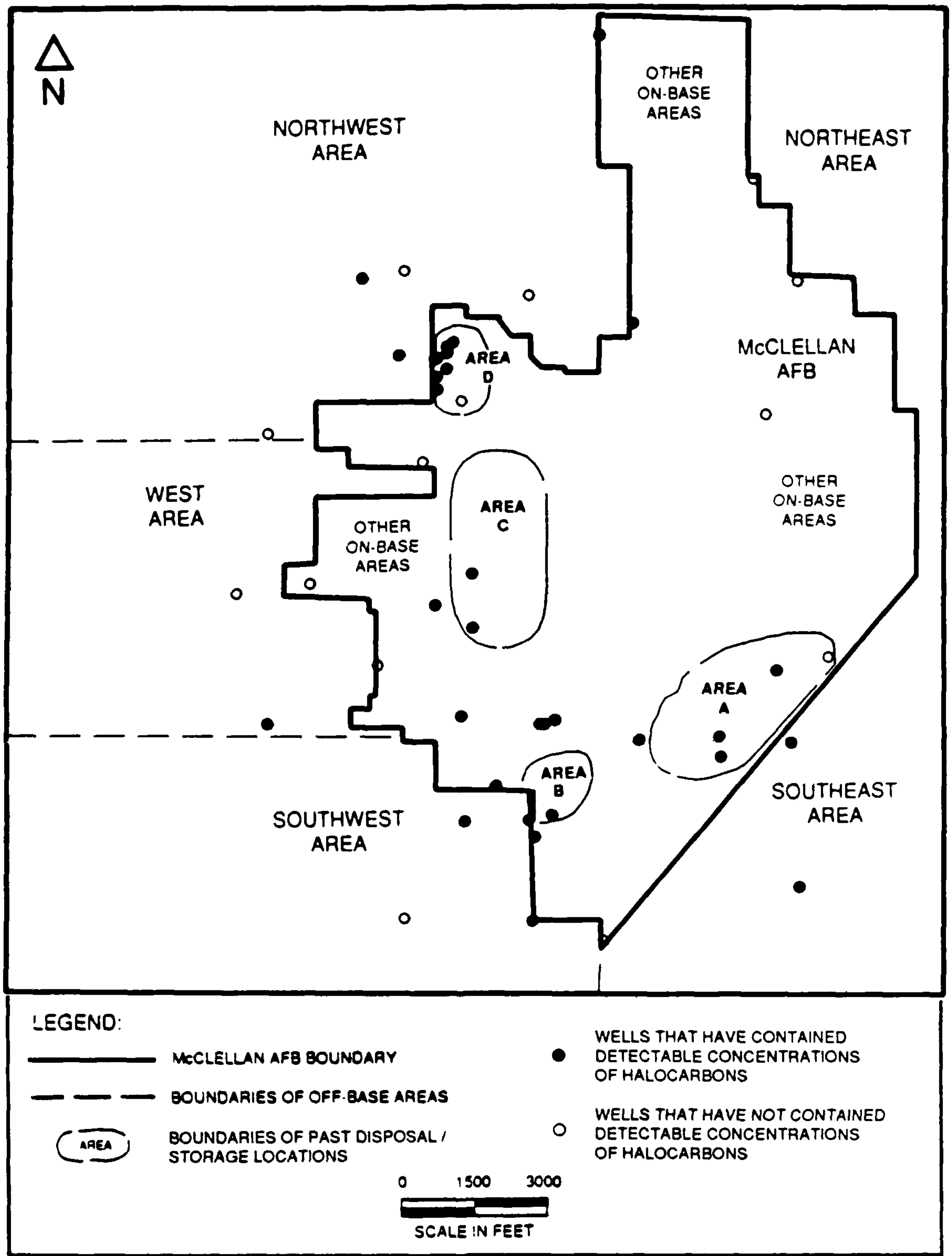

Figure 3-3. Locations of Middle Monitoring Zone Wells that Have Contained Any of Nine Commonly Detected Halocarbons (1981 to First Quarter 1988)

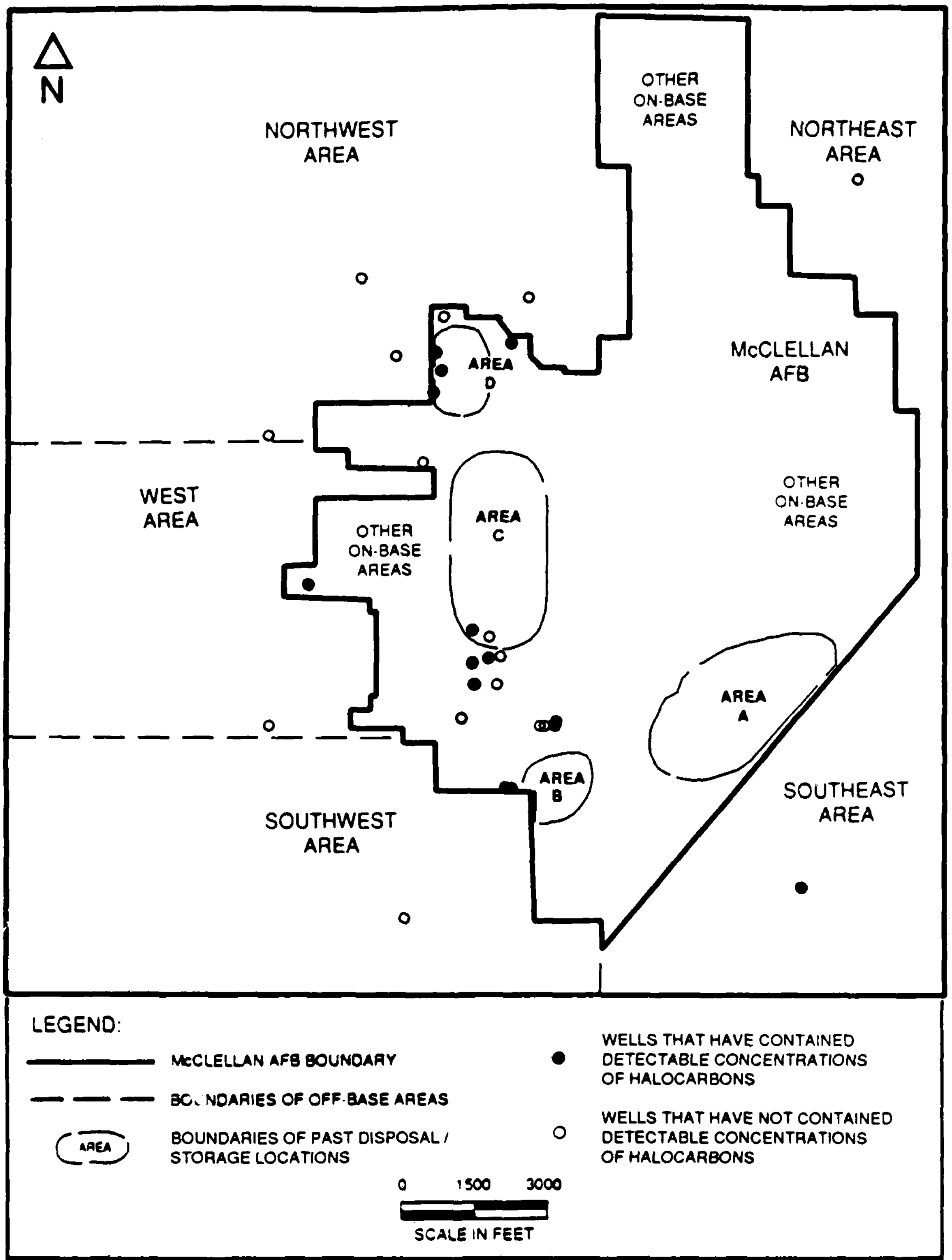

Figure 3-4. Locations of Deep Monitoring Zone Wells that Have Contained Any of Nine Commonly Detected Halocarbons (1981 to First Quarter 1988)

above the California Department of Health Services (DOHS) action levels and/or U.S. EPA Primary Maximum Contaminant Levels for drinking water in 30 wells (First Quarter 1988). Concentrations of chlorinated solvents measured in monitoring wells in Areas C and D have been generally higher than those measured in other areas. Chlorinated solvents have been repeatedly detected in samples from most of the on-base monitoring wells as shown in Figure 3-2, 3-3, and 3-4.

In order to evaluate the migration of contaminants with respect to time, analytical data were segregated into sets by date of sample collection and groundwater monitoring zone designation. Quarterly data from the Second Quarter 1985 to the First Quarter 1988 were plotted and some contouring of TCE concentrations was attempted. Comparisons over a longer time period could not be made due to the lack of consistent sampling data. Preceding data from 1979 to 1985 was not included because wells were not sampled at regular intervals and because the results are from other USAF contractors and other laboratories. Radian has not evaluated QA/QC procedures used by these other contractors and, therefore, cannot use this data quantitatively with confidence.

The present pattern of contaminants as detected in monitoring wells on and off-base indicates that there has been horizontal movement probably in the direction of groundwater flow. This horizontal migration, however, is occurring at a slow rate. In Area C (based on a horizontal hydraulic gradient of 0.001 ft/ft, a K of 275 gpd/ft^2 (Radian, 1988) and an effective porosity (n) of 0.40, groundwater velocity is estimated to be 33 feet per year.

Figures 3-5 and 3-6 show TCE concentrations in shallow zone monitoring wells and estimated contours of TCE concentrations during the Second Quarter 1986 and the First Quarter 1988. The contours on these figures are not meant to depict actual contaminant plumes or edges of detectable TCE concentrations. These contours are based on analytical results from the existing monitoring wells; sampling points outside these contours may show different contaminant patterns. Comparison of the two figures shows no major

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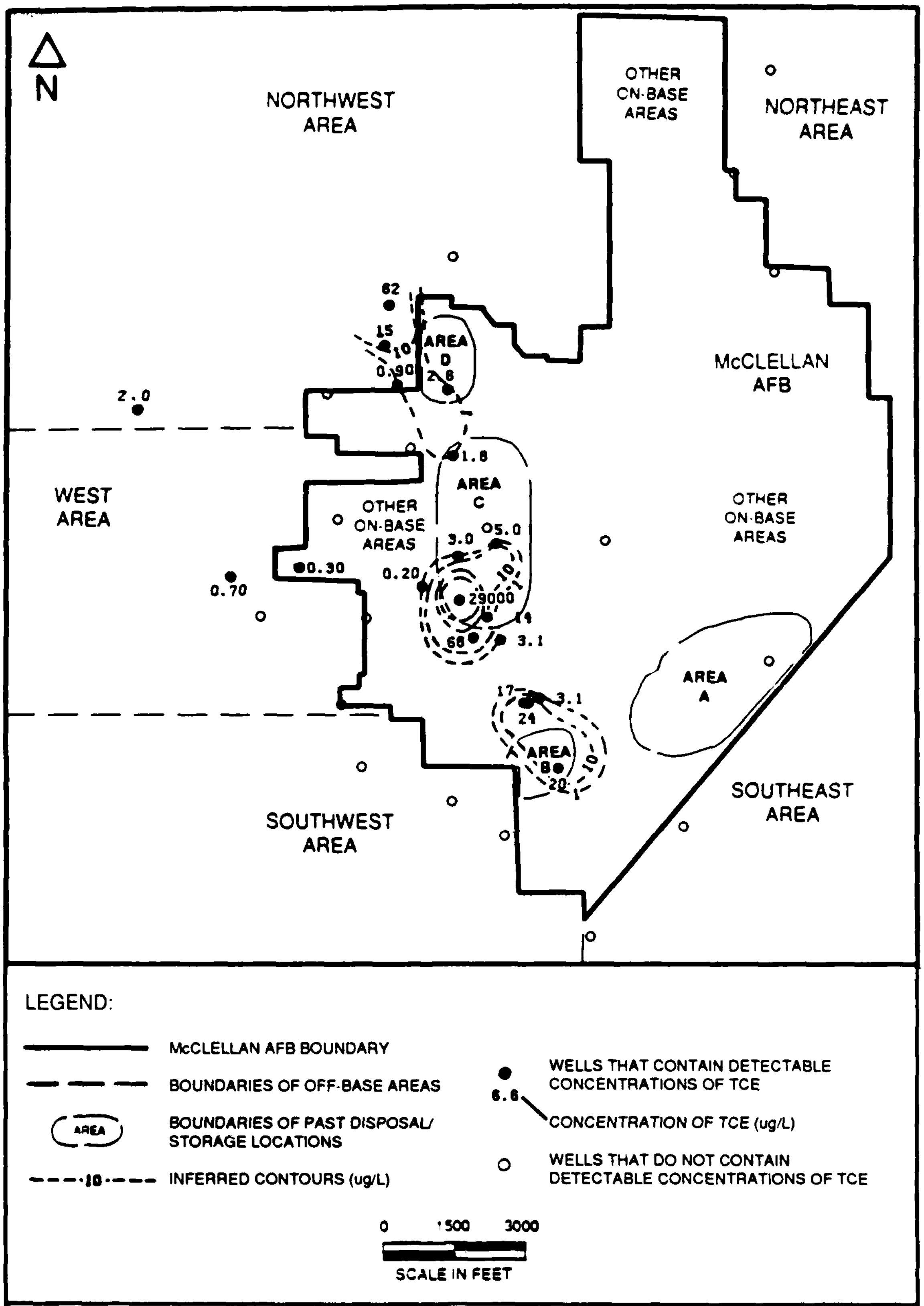

Figure 3-5. Estimated Lateral Distribution of TCE in the Shallow Monitoring Zone During the Second Quarter 1986.

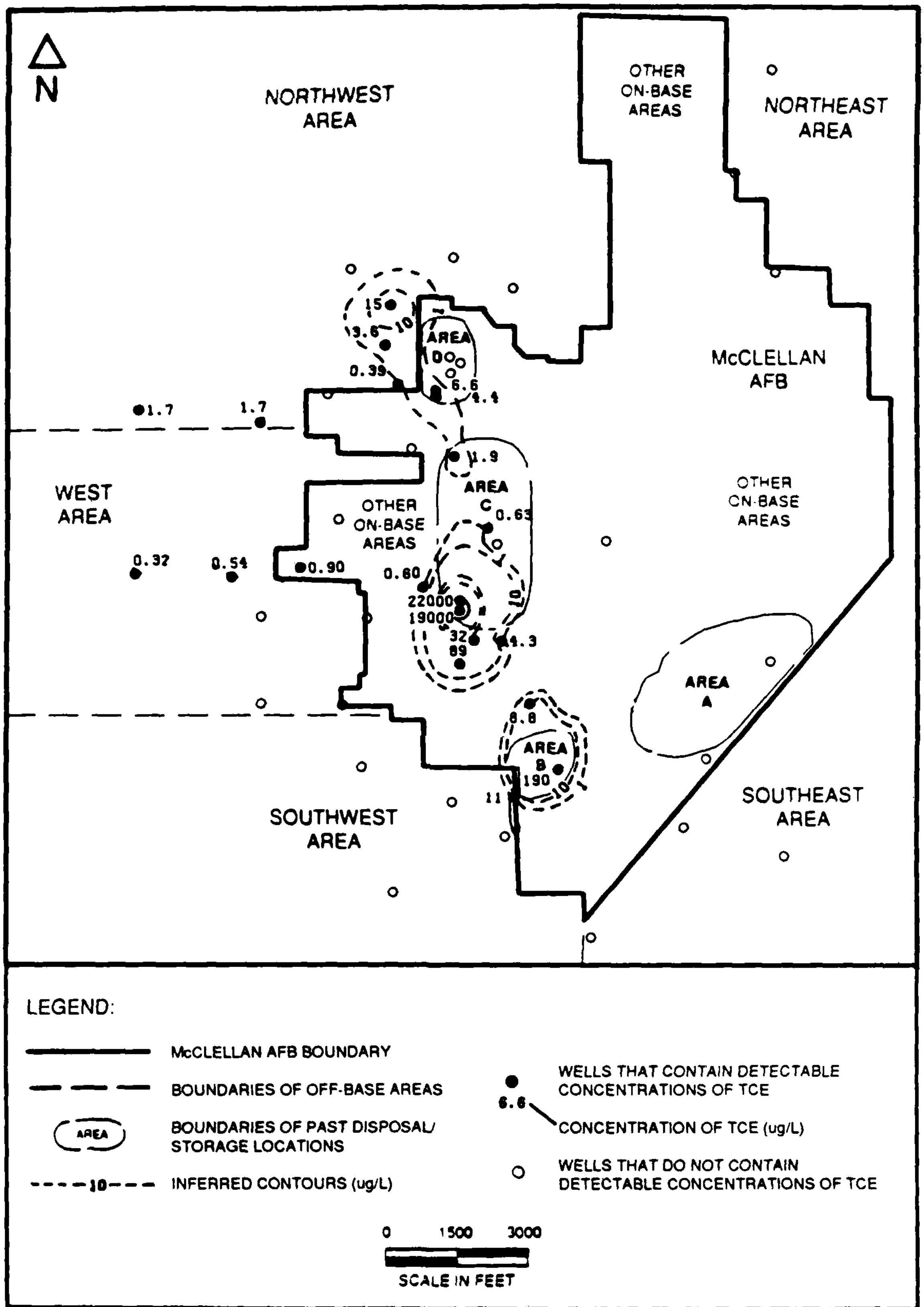

Figure 3-6. Estimated Lateral Distribution of TCE in the Shallow Monitoring Zone During the First Quarter 1988.

changes in contaminant levels over the two year period. Most of the monitoring wells that are common to both figures are located in Area C.

In areas where horizontal gradients are steeper due to removal of groundwater, there are some indications of more rapid horizontal migration of contaminants. Shallow zone monitoring wells in and around Area D have shown a decreasing trend since the extraction system was put into operation. Two off-base wells, MW-1004 and MW-1005, have shown decreases in TCE concentration that are probably due to the operation of the Area D extraction system. A time period longer than a year is needed to determine if the decreasing contaminant level is a consistent trend.

Cross sections were prepared in Areas B, C, and D in an attempt to evaluate the vertical extent of contamination and lateral contaminant migration with respect to time. Although the cross sections allow graphical presentation of concentrations of contaminants in two dimensions, trends are not recognizable because contaminant migration appears to be slow and the period of analytical data is small. Therefore, because the cross sections do not show any apparent trends over time, they were not included in this report.

The following subsections present, by area, available information on the historical horizontal and vertical extent of TCE as detected in monitoring wells, the status of monitoring wells within or adjacent to each area, and information on potential contributors (confirmed sites and unstudied and partially studied potential release locations) to the observed groundwater contamination. The focus of the discussions is on TCE, because this compound has been detected most frequently and most consistently in on- and off-base wells. A summary of maximum concentrations of TCE, vinyl chloride, 1,1-DCE, 1,1-DCA, chloroform, 1,2-DCA, 1,1,1-TCA, carbon tetrachloride, and tetrachloroethene detected in monitoring wells since 1985 is presented in Table 3-3. Based on the sampling variability observed for three compounds in Section 4, one can assume that these values are accurate to within $\pm$ 40 percent. A historical summary of individual wells that have contained these contaminants is included in Appendix B. This appendix contains data that has

TABLE 3-3. RANGES IN CONCENTRATIONS FOR COMMONLY DETECTED ANALYTES a IN MONITORING WELLS FROM 1985 TO 1988, McCLELLAN AFB

Area Designation	Groundwater Monitoring Zone	Analyte	Range of Detectable Concentrations(ug/L) Minimum	Maximum
A	Shallow	1,1-Dichloroethene	0.40	0.40
		Chloroform	3.7	40
		1,2-Dichloroethane	0.20	5.3
		1,1,1-Trichloroethane	0.30	6.5
		Trichloroethene	2.4	190
	Middle	1,1-Dichloroethene	0.10	3.8
		1,1-Dichloroethane	2.6	2.6
		Chloroform	0.10	15
		1,2-Dichloroethane	0.41	0.74
		1,1,1-Trichloroethane	2.6	2.6
		Carbon tetrachloride	5.1	27
		Trichloroethene	0.65	195
	Deep	(There are currently no deep zone wells in Area A)		
B	Shallow	1,1-Dichloroethane	0.21	0.21
		Chloroform	0.20	2.5
		1,2-Dichloroethane	0.19	2.1
		1,1,1-Trichloroethane	2.3	2.3
		Carbon tetrachloride	0.25	0.71
		Trichloroethene	2.7	190
		Tetrachloroethene	0.18	6.2
	Middle	Chloroform	0.95	5.6
		1,1,1-Trichloroethane	0.48	0.50
		Trichloroethene	0.20	86.2
	Deep	1,1-Dichloroethene	0.24	0.76
		1,1-Dichloroethane	0.15	0.15
		Chloroform	0.13	0.90
		1,2-Dichloroethane	0.40	0.90
		Trichloroethene	1.3	210
		Tetrachloroethene	0.15	0.15
C	Shallow	Vinyl chloride	0.60	15
		1,1-Dichloroethene	0.24	8.5
		1,1-Dichloroethane	0.18	10
		Chloroform	0.10	58
		1,2-Dichloroethane	0.12	140
		1,1,1-Trichloroethane	0.24	280
		Carbon tetrachloride	0.31	22
		Trichloroethene	0.20	68000
		Tetrachloroethene	0.12	23

a Analytes included are Vinyl chloride, 1,1-Dichloroethene, 1,1-Dichloroethane, Chloroform, 1,2-Dichloroethane, 1,1,1-Trichloroethane, Carbon tetrachloride, Trichloroethene and Tetrachloroethene

Table 3-3. (Continued)

Area Designation	Groundwater Monitoring Zone	Analyte	Range of Detectable Concentrations(ug/L) Minimum	Maximum
C	Middle	Chloroform	0.96	0.96
		1,2-Dichloroethane	0.74	0.74
		Trichloroethene	0.80	610
	Deep	1,1-Dichloroethene	1.2	297
		1,1-Dichloroethane	0.15	16.7
		Chloroform	0.21	0.43
		1,1,1-Trichloroethane	0.61	133
		Trichloroethene	1.1	350
		Tetrachloroethene	13.5	13.5
D	Shallow	Vinyl chloride	810	810
		1,1-Dichloroethene	0.21	64300
		1,1-Dichloroethane	0.19	3560
		Chloroform	2320	2320
		1,2-Dichloroethane	94.7	2790
		1,1,1-Trichloroethane	21	22800
		Trichloroethene	2.6	26600
		Tetrachloroethene	64.9	2480
	Middle	Vinyl chloride	0.34	2230
		1,1-Dichloroethene	0.25	11500
		1,1-Dichloroethane	2.6	4430
		Chloroform	0.57	3.2
		1,2-Dichloroethane	0.16	300
		1,1,1-Trichloroethane	0.30	1870
		Trichloroethene	0.58	1200
		Tetrachloroethene	0.16	260
	Deep	Vinyl chloride	1.3	1.3
		1,1-Dichloroethene	0.27	270
		1,1-Dichloroethane	0.13	2.0
		Chloroform	0.85	0.85
		1,1,1-Trichloroethane	0.21	19
		Trichloroethene	0.62	290
		Tetrachloroethene	0.10	0.10
OTHER	Shallow	1,1-Dichloroethane	0.20	1.1
		Chloroform	0.10	0.12
		Trichloroethene	0.70	1.1
		Tetrachloroethene	0.12	0.47
	Middle	1,1-Dichloroethene	0.32	0.32
		1,1-Dichloroethane	0.13	0.13
		Chloroform	0.10	0.40
		Trichloroethene	0.39	0.39
	Deep	(There are currently no deep zone wells in Other On-Base Areas)		

Table 3-3. (Continued)

Area Designation	Groundwater Monitoring Zone	Analyte	Range of Detectable Concentrations(ug/L) Minimum	Maximum
NORTHEAST	Shallow	1,1,1-Trichloroethane	0.20	0.28
	Middle	(There are currently no middle zone wells in the Northeast Area)		
	Deep	(No Analytes Detected)		
NORTHWEST	Shallow	Vinyl chloride	0.41	0.43
		1,1-Dichloroethene	0.10	280
		1,1-Dichloroethane	0.40	41
		Chloroform	0.10	2.8
		1,2-Dichloroethane	0.40	14
		1,1,1-Trichloroethane	0.20	16
		Trichloroethene	0.32	100
		Tetrachloroethene	0.10	1.2
	Middle	1,1-Dichloroethene	0.16	0.16
		Carbon tetrachloride	0.20	0.20
		Trichloroethene	0.41	0.41
	Deep	(No Analytes Detected)		
WEST	Shallow	Chloroform	0.10	0.17
		Trichloroethene	0.25	1.7
	Middle	Tetrachloroethene	0.20	0.20
	Deep	(No Analytes Detected)		
SOUTHWEST	Shallow	Chloroform	0.11	0.33
		1,1,1-Trichloroethane	0.25	0.78
		Trichloroethene	0.30	57
		Tetrachloroethene	0.16	5.6
	Middle	Chloroform	0.12	0.49
		1,1,1-Trichloroethane	0.83	0.83
		Trichloroethene	0.30	21
		Tetrachloroethene	0.10	1.0
	Deep	(No Analytes Detected)		
SOUTHEAST	Shallow	(No Analytes Detected)		
	Middle	1,1-Dichloroethene	6.5	6.5
		1,1-Dichloroethane	0.17	0.19
		1,1,1-Trichloroethane	2.5	2.5
		Trichloroethene	1.4	8.9
	Deep	1,1-Dichloroethene	0.75	0.75

been validated by Radian using established QA/QC procedures (Fourth Quarter 1985 to the present) and historical unvalidated data for samples collected from other USAF contractors since 1981. In addition, the locations of monitoring wells, base production wells, and water supply wells are shown on Plate 1, located at the back of this report.

Area A and Adjacent On-Base Areas, and the Southeast Area

There are 15 monitoring wells located in Area A and Adjacent On-Base Areas and 7 located in the Southeast Area. These include 11 network wells, 2 non-network wells, and 9 dry wells (Tables 3-4 and 3-5). Fourteen of these wells are screened in the shallow monitoring zone, seven are screened in the middle monitoring zone, and one is screened in the deep monitoring zone.

Area A is the first area where groundwater contamination was recorded on McClellan AFB. In 1956, base production well BW-7 (constructed in 1942) was taken out of service due to contamination by unspecified hydrocarbons and phenols. This well was abandoned (destroyed) in the 1970s. In 1979, TCE was detected in base production wells BW-1 and BW-2 at concentrations above drinking water standards. These wells were subsequently taken out of service. In 1980, BW-12 was taken out of service for the same reasons. A historical summary of base production well operation and analytical data are presented in Appendix C.

Based on the distribution of monitoring wells, contamination in the shallow monitoring zone appears to be the most extensive. TCE has been found in seven on-base shallow zone monitoring wells in Area A, five of which are now dry. TCE has not been detected in the off-base shallow zone monitoring wells. Of the seven middle zone monitoring wells, TCE has been detected in every well except MW-71. In addition, carbon tetrachloride has been consistently detected in MW-27D since the Third Quarter 1987. The detected concentrations of carbon tetrachloride have been above the drinking water standard of 5.0 ug/L for the past four quarters. A summary table showing concentrations of TCE and other commonly detected halocarbons is included in Appendix B. Although the sampling of local base production wells has indicated that

TABLE 3-4. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN AREA A AND ADJACENT ON-BASE AREAS

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells[c]	Total Number of Wells
Shallow	MW-67 MW-68	None	MW-8[b] MW-9[b] MW-25S[b] MW-26S[b] MW-27S[b] MW-39S MW-40S[b] MW-46S[b]	10
Middle	MW-27D[b] MW-69[b] MW-71	MW-25D[a,b] MW-26D[b]	None	5
Deep	None	None	None	0
Total Number of Wells	5	2	8	15

[a] Water level is measured monthly in this well.

[b] Samples collected from these wells have contained TCE.

[c] Based on recent inspections by Radian, the Air Force is currently evaluating recommendations for well abandonment (destruction).

TABLE 3-5. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN THE SOUTHEAST AREA

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells[b]	Total Number of Wells
Shallow	MW-1013 MW-1014 MW-1037	None	MW-28S	4
Middle	MW-28D[a] MW-1038[a]	None	None	2
Deep	MW-1039	None	None	1
Total Number of Wells	6	0	1	7

[a] Samples collected from these wells have contained TCE.
[b] Based on recent inspections by Radian, the Air Force is currently evaluating recommendations for well abandonment (destruction).

groundwater contamination may exist at depths, there are no existing deep zone monitoring wells in this area. The one deep zone monitoring well present is MW-1039, located off-base in the Southeast Area. TCE has not been detected in this well. Additional deep zone monitoring wells have been recommended to be installed as part of the Hydrogeologic Assessment Report currently being prepared for McClellan AFB. These recommendations are being reviewed by the USAF.

Currently, in Area A and Adjacent On-Base Areas, there are 48 uninvestigated potential release locations (UPRLs), 4 partially studied potential release locations (PSPRLs), and one confirmed site (38). A summary table for these data is included in Appendix A.

Another limitation on interpreting the analytical results are the changes that have occurred in the local flow regime due to the pumping schedules of the base production wells. Six base production wells (BW-1, BW-2, BW-7, BW-10, BW-12, and BW-13) in the eastern and southern portions of the base may have influenced groundwater flow directions in Area A. Of these six wells, BW-10 and BW-13 are the only wells still in service. BW-10 and BW-13 have been in operation since 1945. BW-13 has operated on an intermittent basis since 1987 due to the presence of carbon tetrachloride and is shut down whenever carbon tetrachloride levels are detected above drinking water standards.

Continued operation of BW-10 and BW-13 has had a dominant influence on groundwater flow in Area A and Adjacent On-Base Areas. These influences will change depending on the operating schedules of BW-10 and BW-13. Water supply wells located south of Area A are also factors to be considered (Plate 1).

Based on the limited number of available wells, groundwater within and south of Area A appears to be flowing to the southwest. Carbon tetrachloride has been detected in MW-27D, MW-41S, and BW-13 along this flow path. Carbon tetrachloride may be a good indicator compound to assess contaminant migration from Area A. Based on the occurrence of carbon tetrachloride in these three Area A wells, it may be possible that this compound is emanating from Area A and is flowing toward base production wells BW-13 and BW-18. Sampling of existing wells (MW-25D and MW-26D) and installation and sampling of additional monitoring wells in this area may confirm this possibility.

The absence of wells north of Area A does not allow for determination of groundwater flow or water quality. Monitoring well MW-49S will be sampled during the Third Quarter 1988 to evaluate the current water quality in this area. Although it is though that groundwater is flowing toward active base production well BW-10, the location of the groundwater divide in or north of Area A cannot be specified.

Of the areas on McClellan AFB that have been identified as containing numerous storage and disposal sites, Area A is the least characterized, and hence, the least understood. Radian has recommended in the Hydrogeologic Assessment Workplan for McClellan AFB that additional shallow, middle, and deep zone monitoring wells similar in depth to wells installed by EG&G in Area C be installed in the local area by 1989. Analytical data collected from these wells in the future will assist in characterizing groundwater contaminant distribution and migration from Area A.

Area B and Adjacent On-Base Areas and the Southwest Area

There are 21 monitoring wells located in Area B and Adjacent On-Base Areas, and 10 monitoring wells located in the Southwest Area. These include 18 network wells, 12 non-network wells, and 6 dry wells (Tables 3-6 and 3-7). Twelve of these wells are screened in the shallow monitoring zone, 10 are screened in the middle monitoring zone, and 9 are screened in the deep monitoring zone. There are three well clusters in these areas, including MW-120/MW-121/MW-122, MW-1021/MW-1022 and MW-1000/MW-1020.

Water quality problems were initially identified in 1979 when TCE was detected in BW-18. Currently, the well is operating with a wellhead water

TABLE 3-6. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN AREA B AND ADJACENT ON-BASE AREAS

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells	Total Number of Wells
Shallow	MW-41S[a] MW-117[a] MW-120[a]	MW-7[a] MW-65[a] MW-123[a]	MW-23S[a, c]	7
Middle	MW-23D MW-121	MW-5 MW-6[a] MW-118[a] MW-124[a]	None	6
Deep	MW-63[a] MW-122 MW-132[a]	MW-64 MW-66[b] MW-119 MW-125 MW-127[a]	None	8
Total Number of Wells	8	12	1	21

[a] Samples collected from this wells have contained TCE.
[b] Water level is measured monthly in this well.
[c] Based on recent inspections by Radian, the Air Force is currently evaluating recommendations for well abandonment (destruction).

TABLE 3-7. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN THE SOUTHWEST AREA

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells	Total Number of Wells
Shallow	MW-1011 MW-1016 MW-1020[a] MW-1021[a] MW-1023	None	None	5
Middle	MW-1000 MW-1015 MW-1022[a] MW-1024	None	None	4
Deep	MW-1025	None	None	1
Total Number of Wells	10	0	0	10

[a] Samples collected from these wells have contained TCE.

treatment unit. In the Southwest Area, two private wells and one Sacramento city well (CW-150) were closed due to TCE contamination.

TCE has been detected in 9 shallow zone monitoring wells. One of these wells is now dry (MW-23S) and one is located off-base in the Southwest Area (MW-1021). Samples collected from four middle zone monitoring wells and three deep zone monitoring wells have also contained TCE. Table 3-3 shows the maximum concentrations of TCE and other chlorinated hydrocarbons detected within each of the three groundwater monitoring zones.

The 18 monitoring wells that are part of the network have been sampled on a quarterly basis since the Fourth Quarter 1986. The concentrations of TCE detected in three of the shallow zone monitoring wells and two of the deep zone monitoring wells have been consistently above drinking water standards since the Fourth Quarter 1986. TCE has been consistently detected in two of the middle zone monitoring wells and drinking water standards have been exceeded in one of these wells in five of the past six quarters. A summary table showing historical concentrations of TCE and other commonly detected contaminants is presented in Appendix B.

In Area B and Adjacent On-Base Areas, there are 19 UPRLs, 3 PSPRLs, and 2 confirmed sites. A summary table for these data is included in Appendix A. During McClaren Environmental Engineering's study of Area B (1986), TCE was detected in one of three soil borings.

BW-18 is the only water supply well currently in service located in Area B and Adjacent On-Base Areas. In 1980, BW-18 was found to be contaminated and was taken out of service in June 1981. With the addition of a wellhead water treatment facility to treat organic compounds, BW-18 has remained an active production well. BW-13 is used intermittently, and BW-17 and BW-19 are currently not in service. Additional data on the operation of these wells is presented in Appendix C. The historic withdrawal of groundwater by on- and off-base water supply wells has affected the groundwater gradients in Area B and the Southwest Area, but these historical effects cannot be quantified because of the lack of historical water level data.

Horizontal and vertical gradients were estimated from the monthly water-level data. Well cluster MW-120/MW-121/MW-122 is located approximately 2000 feet north of BW-18. Horizontal gradients during the First Quarter 1988 in this area for all three monitoring zones are approximately 0.002 ft/ft. Vertical gradients between the shallow and middle monitoring zones are approximately -0.02 ft/ft (downward flow potential) and between the middle and deep monitoring zones are approximately +0.02 ft/ft (upward flow potential). Closer to BW-18, vertical gradients are steeper as would be expected. Well cluster MW-1021/MW-1022 is located approximately 250 feet to the south of BW-18. The vertical gradient between the shallow and middle monitoring zones during the First Quarter 1988 was approximately -0.11 ft/ft (downward flow potential) at this location.

Although sources of contaminants have not been clearly identified, pumping of BW-18 appears to be inhibiting contaminants from migrating further to the south. Lateral and vertical migration of contaminants is probably dominated by pumping of BW-18. For example, MW-23, a middle zone monitoring well is located approximately 600 feet south of BW-18. TCE has not been detected in this monitoring well that has been sampled since Fourth Quarter 1986. In addition, the two deep zone monitoring wells located approximately 500 feet northwest of BW-18 (MW-63 and MW-132) have consistently contained TCE above drinking water standards.

Area C and Adjacent On-Base Areas

There are 48 monitoring wells located in Area C and Adjacent On-Base Areas. Thirty-five of these are network wells, 7 are non-network wells, and 6 are dry wells. Twenty-seven wells are screened in the shallow monitoring zone, 8 are screened in the middle monitoring zone, and 13 are screened in the deep monitoring zone. Most of the monitoring wells located in Area C and Adjacent On-Base Areas are located in and around the southern end of Area C. Eleven of the network wells (MW-133 to MW-143) were installed during the

Fourth Quarter 1987 and sampled by Radian for the first time during the First Quarter 1988. Table 3-8 presents the status of the 48 monitoring wells located in Area C and Adjacent On-Base Areas.

Groundwater contamination was initially detected in 1982, when sampling of two monitoring wells indicated that TCE was present in the shallow groundwater. TCE has been detected in 13 of the shallow zone monitoring wells, 3 of the middle zone monitoring wells, and in 6 of the deep zone monitoring wells. A summary table showing maximum concentrations for TCE and other halocarbons is presented in Table 3-3. Values for individual wells are shown in Appendix B. An interim extraction system, consisting of four extraction wells, is being installed south of Area C (EG&G, 1988). This system, scheduled to begin pumping during the Third Quarter, 1988, will extract groundwater from an area south of Area C for treatment at the Groundwater Treatment Plant.

There are 12 confirmed sites, 28 PSPRLs, and 3 UPRLs that have been identified in Area C and Adjacent On-Base Areas. A summary table of these data is included in Appendix A. The middle and deep zone monitoring wells adjacent to shallow monitoring zone well MW-128 show much lower levels of TCE. Further to the south, however, samples collected from deep zone monitoring wells MW-136 and MW-137 contained elevated levels of TCE (230 and 350 ug/L, respectively). A cluster of wells screened in the middle and deep monitoring zones is located approximately 2,100 feet south of MW-128. During the First Quarter 1988, TCE was detected in MW-135, the middle zone monitoring well. Samples collected from the two deep zone monitoring wells of this cluster did not contain TCE.

Two production wells located in Area C and Adjacent On-Base Areas, BW-6 and BW-16, are reportedly "old farm wells" that existed during the early land acquisition by McClellan AFB, but have not been used by the base. There are no active production wells near Area C.

TABLE 3-8. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN AREA C AND ADJACENT ON-BASE AREAS[a]

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells[d]	Total Number of Wells
Shallow	MW-21S[b] MW-33S[b] MW-36S[b] MW-44S[b] MW-60[b] MW-61[b] MW-62 MW-107 MW-110 MW-111[b] MW-114[b] MW-128 MW-131[b] MW-139[b]	MW-2[c] MW-77 MW-78 MW-79 MW-80 MW-81 MW-82	MW-20S[b] MW-22S[b] MW-34S MW-35S MW-37 MW-45S[b]	27
Middle	MW-20D MW-21D[b] MW-75 MW-108 MW-113 MW-115 MW-129[b] MW-135[b]	None	None	8
Deep	MW-22D[b] MW-109 MW-112 MW-130[b] MW-133 MW-134 MW-136[b] MW-137[b] MW-138 MW-140[b] MW-141[b] MW-142 MW-143	None	None	13
Total Number of Wells	35	7	6	48

[a] These monitoring zone designations do not agree with those defined by EG&G, (1988).
[b] Samples collected from these wells have contained TCE.
[c] Well selected for abandonment (destruction).
[d] Based on recent inspections by Radian, the Air Force is currently evaluating recommendations for well abandonment (destruction).

Potentiometric surface maps for the three groundwater monitoring zones indicate a southerly flow in this portion of the base. The closest production well (BW-18), is located approximately 3,000 feet south of Area C. Vertical gradients are comparable to the horizontal gradients within and south of Area C indicating that heterogeneties in the conductivities and physical properties of the contaminants may be the major influences on downward migration of contaminants. The southerly migration of TCE from Area C is likely influenced by both the groundwater flow patterns and the physical properties of the aquifer material. As more analytical data are collected from the new wells in Area C and additional wells recommended in the Hydrogeologic Assessment Report for McClellan AFB currently underway, migration flow paths may be defined more precisely.

The West Area

There are seven monitoring wells located in the West Area. All seven wells are all included in the monitoring well network (Table 3-9). Four are screened in the shallow monitoring zone, two are screened in the middle monitoring zone, and one is screened in the deep monitoring zone. There are two well clusters in the West Area. Three wells (MW-1033, MW-1034, and MW-1035) monitor the shallow, middle, and deep zones, respectively. The second cluster consists of MW-1018 and MW-1032. This cluster monitors the shallow and middle monitoring zones, respectively.

TCE has been detected in samples collected from two shallow zone monitoring wells located in the northern half of the West Area. Tetrachloroethene, however, was detected at low levels (0.2 ppb) in one middle zone monitoring well (MW-1034) during the Fourth Quarter 1987. The levels of TCE detected in the two shallow zone monitoring wells are consistently low (<1.0 ug/L) and do not appear to be changing with time. A summary of maximum concentrations for TCE and other halocarbons is presented in Table 3-3. Historical concentrations for wells containing these contaminants are presented in Appendix B.

TABLE 3-9. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN THE WEST AREA

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells	Total Number of Wells
Shallow	MW-1017 MW-1018[a] MW-1033 MW-1036[a]	None	None	4
Middle	MW-1032 MW-1034	None	None	2
Deep	MW-1035	None	None	1
Total Number of Wells	7	0	0	7

[a] Samples collected from these wells have contained TCE.

The wells located in the West Area are currently referred to as "upgradient" wells. Groundwater flow in this area is to the east-southeast. Contaminants detected in these wells may be a result of off-base migration of contaminants in the past (when groundwater flowed in a westerly direction) or may be emanating from another source. However, there are currently insufficient data to support either of these hypotheses.

Area D and Adjacent On-Base Areas, and the Northwest Area

There are a total of 50 monitoring wells located in Area D and Adjacent On-Base Areas and in the Northwest Area. Forty-two are network wells and 8 are non-network wells. This includes 23 wells screened in the shallow monitoring zone, 17 screened in the middle monitoring zone, and 11 screened in the deep monitoring zone (Tables 3-10 and 3-11).

TCE has been detected in 14 shallow zone monitoring wells, 9 middle zone monitoring wells, and 2 deep zone monitoring wells.

As a result of previous evaluation of these data by other USAF contractors, a interim remedial measure (IRM) has been implemented in Area D. This IRM consists of a groundwater extraction and treatment system and a cover consisting of a synthetic liner and clay cap. A detailed evaluation of the effectiveness of the extraction system is presented in Section 5.4.

In Area D and Adjacent On-Base Areas, there are 10 confirmed sites, 2 PSPRLs, and 1 UPRL. These mainly consist of sludge/oil and burn pits. Much of the soil in these areas was removed prior to installation of the cover. A summary table of these data is included in Appendix A.

Prior to operation of the Area D extraction system, groundwater flow and contaminant migration in this area of the base was west-northwest. Since the system became operational, the direction of flow and migration has reversed. Groundwater is flowing towards the base in all three monitoring zones. In addition, concentrations of TCE and other contaminants detected in wells have reduced substantially in both on- and off-base monitoring wells.

TABLE 3-10. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN AREA D AND ADJACENT ON-BASE AREAS

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells	Total Number of Wells
Shallow	MW-10[a] MW-11[a] MW-12[a] MW-14[a] MW-15[a] MW-19S[a,c] MW-88 MW-89 MW-90 MW-91[a] MW-92[a]	MW-13[b] MW-56	None	13
Middle	MW-52[a] MW-53[a] MW-54[a] MW-55[a] MW-57[a] MW-70[a] MW-72[a]	MW-19D MW-38D[a]	None	9
Deep	MW-51 MW-58[a] MW-59[a] MW-104 MW-105	MW-1[b]	None	6
Total Number of Wells	23	5	0	28

[a] Samples collected from these wells have contained TCE.

[b] Well has been abandoned (destroyed).

[c] Well is periodically dry or contains insufficient water to sample.

TABLE 3-11. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN THE NORTHWEST AREA

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells	Total Number of Wells
Shallow	MW-1002[a] MW-1004[a] MW-1005[a] MW-1009 MW-1019[a] MW-1026 MW-1029[a] MW-1041[a]	MW-1008[b]	None	9
Middle	MW-74 MW-76 MW-1003 MW-1010 MW-1027 MW-1030 MW-1042[a]	MW-1007[b]	None	8
Deep	MW-1001 MW-1028 MW-1031 MW-1043	MW-1006[b]	None	5
Total Number of Wells	19	3	0	22

[a] Samples collected from these wells have contained TCE.

[b] Well selected for abandonment (destruction).

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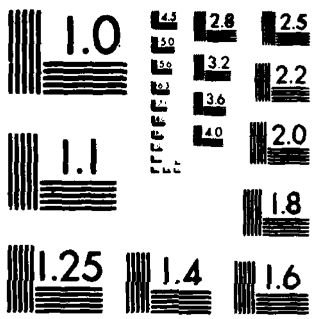

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TCE and other halocarbons continue to be detected at low concentrations (<5 ug/L) in two shallow zone monitoring wells located in the southern portion of the Northwest Area (MW-1019 and MW-1029). These wells are also currently located upgradient of McClellan AFB. Contaminants detected may have, as addressed in the West Area discussion, resulted from past off-base migration or may be emanating from another source. However, there is currently insufficient data to support either hypothesis.

Other On-Base Areas

There are 25 monitoring wells located in other On-Base Areas. These include 11 network wells, 7 non-network wells, and 8 dry wells. Seventeen wells are screened in the shallow monitoring zone, 7 are screened in the middle monitoring zone, and 2 are screened in the deep monitoring zone (Table 3-12). These wells are located throughout the base as shown on Plate 1, located at the back of this report.

TCE has been detected in two shallow zone monitoring wells and two middle zone monitoring wells at low levels (<1.5 ug/L). These wells are located northeast of Area D, at the southern boundary of the base, and northeast of Area A. A summary of maximum concentrations of TCE and other detected halocarbons is presented in Table 3-3. Individual concentrations of TCE and other contaminants present in these wells are shown in Appendix B.

There are 2 confirmed sites, 3 PSPRLs, and 13 UPRLs located in Other On-Base Areas. These consist of open ditches, landfills, aircraft maintenance hangars, and underground storage tanks. A summary table for these data is included in Appendix A.

The Northeast Area

There are two monitoring wells located in the Northeast Area (Table 3-13). One is screened in the shallow monitoring zone (MW-1012) and the other is screened in the deep monitoring zone (MW-1040). Both wells are included in the monitoring well network. Low levels of 1,1,1-TCA have been detected twice

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TABLE 3-12. SUMMARY OF MONITORING WELL STATUS AND HISTORICAL OCCURRENCE OF TCE IN OTHER ON-BASE AREAS

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells[c]	Total Number of Wells
Shallow	MW-31S MW-101 MW-102 MW-106 MW-116	MW-16S[a,d] MW-18S[a] MW-43S[a,b] MW-49S	MW-17S MW-24S MW-29S MW-30S[d] MW-42S MW-47S MW-48S MW-50	17
Middle	MW-17D[d] MW-18D MW-24D MW-29D MW-100 MW-103	MW-16D[a]	None	7
Deep	None	MW-3[c] MW-4[c]	None	2
Total Number of Wells	11	7	8	26

[a] Water levels are measured monthly in these wells.

[b] Groundwater samples are to be collected from these wells during the Third Quarter 1988.

[c] Wells selected for abandonment (destruction).

[d] Samples collected from the wells have contained TCE.

TABLE 3-13. STATUS OF MONITORING WELLS LOCATED IN THE NORTHEAST AREA

Groundwater Monitoring Zone	Network Wells	Non-Network Wells	Dry Wells	Total Number of Wells
Shallow	MW-1012	None	None	1
Middle	None	None	None	0
Deep	MW-1040	None	None	1
Total Number of Wells	2	0	0	2

in MW-1012, but no other halocarbons have been detected in this well. Purgeable halocarbons have not been detected in MW-1040, since the well was initially sampled in 1985. Groundwater flow in this area appears to be to the south-southwest. Because of this on-base flow direction, the two monitoring wells in the Northeast Area are helpful in determining up-gradient water quality and identifying any on-base migration of contaminants.

3.8 Summary of Contaminant Migration and Distribution

Based on analyses of the available analytical and hydrologic data, no distinct trends in contaminant migration can be recognized at this time. The limited data available at this time suggest that temporal trends in the lateral migration of contaminants are slow. Available aquifer parameter data, analytical data, and the distribution of monitoring wells are limited for determining migration pathways from PRLs to groundwater monitoring wells. Planned future investigations of PRLs, installation of additional monitoring wells, and subsequent collection of additional groundwater quality data will aid in defining contaminant distribution and migration.

Contaminant distribution appears to be most strongly influenced by the physical characteristics of the aquifer material, the physical properties of the contaminants and groundwater extraction by the base production and extraction wells, and off-base water supply wells.

There is evidence of lateral migration of the contaminants as seen from current maps of TCE concentrations. Comparisons of TCE concentration maps from Second Quarter 1986 with First Quarter 1988, however, show minimal changes in concentrations and areal extent of contaminants. Thus contaminants appear to be migrating laterally at a very slow rate.

4.0 SAMPLING AND ANALYTICAL VARIABILITY

Variability associated with sampling and analytical procedures is inherent in any environmental measurement system. This variability must be quantified before historical trends or patterns can be identified with any degree of confidence because it distinguishes between normal (expected), and "real" changes in the measured parameters; in this case, an increase or decrease in contaminant levels in the groundwater. The variability in the groundwater contaminant results for the McClellan AFB Quarterly Groundwater Sampling and Analysis Program was quantified so that concentration changes could be classified as either being within the expected variability, or representing a change attributable to other factors such as seasonal effects, migration, or degradation. Once a range for sampling and analytical variability is established, deviations beyond this range should be investigated for some other factor which is causing the variability. Thus, this analysis is of primary importance to the trend analysis of Section 5, and in addition, provides an evaluation of the sampling and analysis processes.

In order for the results for the sampling and analysis program to be considered valid, the variation due to sampling and analysis error must be within the guidelines previously established for the Quarterly Sampling and Analysis Program, and formally set forth in the Quality Assurance Project Plan (QAPP) currently being developed. The method for quantifying these errors involves an analysis of the results of laboratory and field duplicates. For this analysis, the results for all field and laboratory duplicate pairs from the Fourth Quarter 1985 through the First Quarter 1988 were considered. The most commonly detected contaminants were evaluated, and include trichloroethene (TCE), tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethane (1,1-DCA), 1,1,1-trichloroethane (1,1,1-TCA), vinyl chloride, and chloroform.

Laboratory and field duplicates are collected and analyzed routinely to assess variability attributable to the analytical and sampling processes. Samples for laboratory duplicate analysis are randomly selected after field samples are received by the laboratory. The results from duplicate analyses provide measures of analytical variability, which includes variability resulting from sample preparation and instrumentation. For example, errors could result from matrix effects, errors in calibration of the instrument, or in computation of the dilution factor.

Field duplicates are collected in the field at the same time as other field samples, and are analyzed under the same conditions using the same laboratory techniques. The field duplicate results measure sampling variability including variations in the heterogeneity of the environment, and variations in sample collection and handling, as well as analytical variability described above. By this definition, field duplicates provide a measure of total variability due to random sources. Thus, also by definition, analytical variability is a component of sampling variability; therefore, sampling (or total) variability is greater than analytical variability.

Field and laboratory duplicate results for samples collected from the Fourth Quarter 1985 through the First Quarter 1988 were compiled for the selected contaminants. The data were screened to include only pairs for which both values are above the Method Detection Limit (MDL). Results below the MDL are reported as "Not Detected" and, therefore, do not represent quantitative values for use in this statistical analysis. Therefore, if either result for the pair was below the MDL, the pair was not included in the calculations.

After screening the results, descriptive statistics (N, mean, standard deviation, range) were calculated to characterize the data. These statistics identified data sets that contain few observations, or show a limited concentration range that might influence the results. Contaminants that had fewer than five pairs of data that satisfied the screening were not evaluated further because making inferences about all measurements from such a small data set would not be useful. For each contaminant which had a sufficient number of pairs of data, four statistics were calculated for both the sample set of field duplicates and the sample set of laboratory duplicates. These statistics are the Coefficient of Variation (CV), the Relative

Percent Difference (RPD), the pooled CV and pooled RPD. An explanation of these terms is given below and the formulas are shown in Table 4-1. Based on the calculations of these statistics, the variability was quantified for the cases where such a quantification could be justified.

The Coefficient of Variation (CV) is the relative standard deviation of a pair of data points; that is, CV is the standard deviation of the pair (S) divided by the mean ($\bar{x}$) and expressed as a percent. Since the CV is a percentage, it is independent of the magnitude of the concentrations in the data set. Furthermore, it is a standardized value which enables the direct comparison of the variation among pairs for a contaminant. Therefore, for each compound with five or more pairs of valid data points, the CV was calculated for each pair of the laboratory duplicate set and for each pair of the field duplicate set. The pooled CV, CV_p, is a weighted average of the sum of squared CVs for a series of related CVs, and gives an overall estimate of the variability of the system being evaluated. For each contaminant, the pooled CV was calculated for the sampling or total variability and for the analytical variability. The weights (df_i) in this case are all one since each pair represents only one observation.

The Relative Percent Difference (RPD) is the difference of the pair divided by the mean of the pair, expressed as a percent. This statistic is used for paired data and is directly related to the CV since the RPD = /2 x CV. The pooled RPD was calculated similarly to the pooled CV, as an average of the squared RPD values for each set of paired observations. Because both the CV and RPD are used to evaluate control limits, both were calculated. The results for each variability analysis presented in the following subsections are discussed in terms of the RPD rather than the CV since it is specifically applicable to paired data.

TABLE 4-1. RESULTS OF SAMPLING (OR TOTAL) AND ANALYTICAL VARIABILITY ANALYSES

Compound	Total Variability			Analytical Variability		
	n	CV_p	RPD_p	n	CV_p	RPD_p
Vinyl chloride	7	15.1	21.3	--		
1,1-DCE	26	16.7	23.6	10	19.8	28.0
1,1-DCA	25	14.1	20.0	9	16.4	23.2
Chloroform	19	18.3	26.0	--		
1,2-DCA	13	11.3	16.0	6	33.5	47.4
1,1,1-TCA	12	21.4	30.3	6	9.5	13.4
TCE	53	21.9	30.9	19	17.8	25.2
PCE	8	12.4	17.6	--		

$$CV = (S/\bar{X}) \times 100, \quad S = (X_1 - \bar{X})^2 + (X_2 - \bar{X})^2, \quad \bar{X} = \frac{X_1 + X_2}{2}$$

$$CV_p = \left[\sum_{i=1}^{n} (CV_i)^2 \, df_i \Big/ \sum_{i=1}^{n} df_i \right]^{1/2}$$

$$RPD = \left[X_1 - X_2 \Big/ (X_1 + X_2)/2 \right] \times 100 = CV\,(2)^{1/2}$$

$$RPD_p = \left[\left(\sum_{i=1}^{n} RPD_i \right)^2 \Big/ n \right]^{1/2}$$

4.1 Sampling Variability

A total of 75 field duplicate pairs (or a frequency of 10 percent, as recommended by the U.S. EPA Method and specified by the scope of work), were collected and analyzed from the Fourth Quarter 1985 through the First Quarter 1988. The number of pairs that showed quantitative concentrations for both values of the pair varied significantly, from 0 to 53 pairs for the selected contaminants. Ideally, the quantitative results would be distributed equally over time, that is, approximately the same number of quantitative pairs of field and laboratory duplicates for each quarter. This is not always the case because the laboratory duplicates were selected at random in the laboratory. The field duplicate samples, which were selected during planning for each quarterly sampling effort, generally had a larger number of usable pairs than the laboratory duplicates. However, since there are relatively few pairs of quantitative results over 10 quarters of sampling (relative to the total number of samples collected), it is unrealistic to expect a good temporal distribution.

Table 4-1 shows the results for sampling (or total) variability and analytical variability. For sampling variability, the number of quantitative pairs of results used for the calculations ranges from 7 to 53. The pooled results for RPD range from 16.0 percent for 1,2-DCA to 30.9 percent for TCE. These results are well within the objective of 50 percent that has been used throughout this program, and is proposed in the QAPP currently being developed for McClellan AFB. The most common chlorinated solvents (TCE, 1,1-DCE and 1,1-DCA) have the greatest number of pairs of quantitative results and the most equally distributed results over time and, therefore, show the most representative estimates of variability. These contaminants have more than 20 quantitative pairs of results, which approaches what can be defined as a "large" data set, and indicates that the results can be considered to be statistically valid. A general rule is that 30 is considered a large sample set, and a normal distribution of mean results can then be assumed. These are the only compounds for which the sampling variability can be reliably quantified at this time, because they have enough pairs of data to be statistically significant. The pooled RPD results are 31 percent for TCE, 24 percent for 1,1-DCE, and 20 percent for 1,1-DCA. Figure 4-1 shows the distribution of RPDs with respect to the mean concentrations, and pooled RPD for each pair of results for these three compounds. The points are randomly scattered about the pooled RPDs, and do not show a trend with respect to concentration. This indicates that the results are applicable over the entire concentration range reported for the contaminants.

An example of how the calculated variability can be used to interpret a reported value of 5.0 ug/L for TCE. The RPD for TCE is 31 percent, so the expected variability for this result would be 5.0 ug/L ± 31 percent, or 5.0 ± 1.6 ug/L. For a reported value of 1,000 ug/L, the corresponding range would be 1,000 ± 310 ug/L. Thus, a well with a reported TCE level of 5.0 ug/L would have to show a concentration less than 3.4 ug/L or greater than 6.6 ug/L the next quarter before it could be stated that the TCE concentration groundwater in the well actually exhibited a change that cannot be attributed to total variability. Similarly, for a reported TCE level of 1,000 ug/L, a concentration less than 690 ug/L or greater than 1,310 ug/L the next quarter would be required to show an actual change in concentration.

4.2 Analytical Variability

A total of 75 pairs of laboratory duplicates have been analyzed from the fourth quarter of 1985 through the first quarter of 1988, at the same frequency as for field duplicates. However, the number of pairs which show at least one quantitative value is much lower because the samples for duplicate analysis are randomly selected by the laboratory. The low numbers of pairs suitable for characterizing analytical variability limits the sample size which means that there is little statistical confidence in the validity of the results.

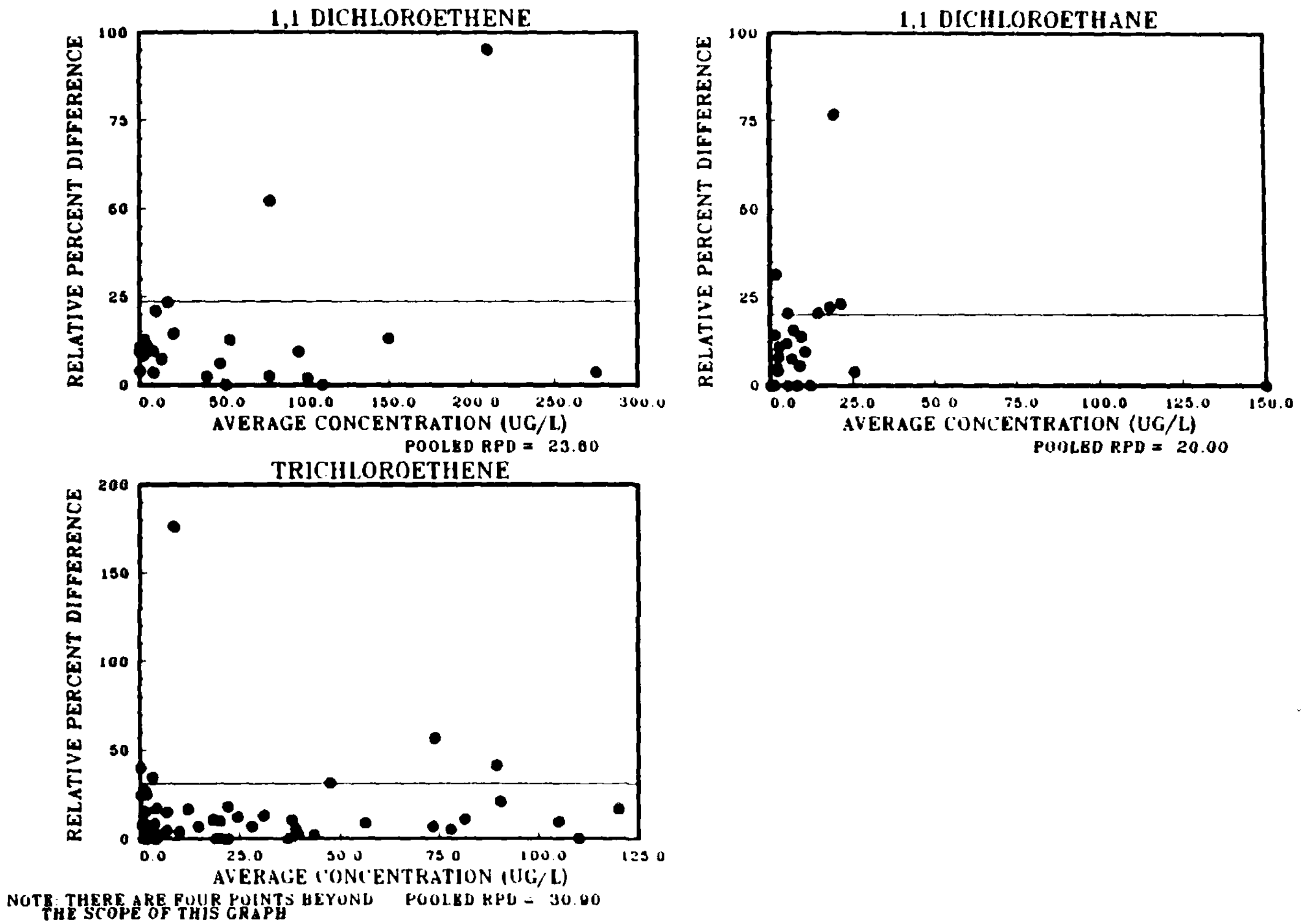

Figure 4-1. Distribution of the Relative Percent Difference for 1,1-Dichloroethene, 1,1-Dichloroethane, & Trichloroethene

Zero to 19 pairs of laboratory duplicate results for the selected contaminants were quantitative. The pooled RPDs range from 13 percent for TCE to 47 percent for 1,2-DCA, as shown in Table 4-1. For 1,2-DCA, however, there were only 6 samples with quantitative results. One pair has an RPD of 112 percent and all other pairs have an RPD of less than 28 percent. Therefore, the large pooled RPD of 47 percent for this analyte is due to the small sample size and one observation causing the pooled result to be high. A larger sample size should minimize the effect of this one value. All other pooled RPD's are less than the objective of 30 percent as proposed in the QAPP. The sample sizes are much smaller than those for the sampling variability, and therefore, it is difficult to relate these RPDp's to the RPDp's for total variability. The calculated analytical variability for the most commonly detected contaminants (TCE, 1,1-DCE, and 1,1-DCA) are 25 percent, 28 percent, and 23 percent, respectively. As stated earlier, the analytical variability is a component of the total variability and therefore, the analytical variability should be less than the total variability. TCE is the only analyte with a sample size (19) large enough to be considered valid. The pooled RPD for analytical variability is 25 percent compared with 31 percent for total variability.

Again, it should be pointed out that for the set of wells studied for the sampling (or total) variability, there is an analytical variability inherent in the results. Therefore, though it cannot be quantified, the analytical variability for TCE must be less than 31 percent, for 1,1-DCE it must be less than 24 percent and for 1,1-DCA it must be less than 20 percent for the pairs of data points used for the sampling variability. The results of 25, 28, and 23 percent, respectively, calculated for the laboratory duplicate pairs, are based on significantly fewer pairs of data (9 to 19 pairs) than for the corresponding sampling variability results. The different numbers of pairs available for this analysis is probably the reason that the analytical variability results are larger in some cases than the sampling variability. When more pairs are available for this study, the analytical variability should be lower since the pooled RPD will not be influenced so greatly by one observation.

4.3 Conclusions

The results of the variability analyses for sampling (total) variability and analytical variability expressed as RPD can be applied with confidence only for sampling variability for three compounds. The results for TCE, 1,1-DCE, and 1,1-DCA are justifiable, considering the sampling and analytical processes and sources of variability inherent in those processes. These results are also well within the overall data quality objective of a RPD less than 50 percent for field duplicates, which is indicative of good sampling procedures. The factor which limits the degree of confidence for the other contaminants and the analytical variability assessment is that there are too few quantitative data pairs. As more data become available, the results should show analytical variability as a component of total variability. Also, with a larger sample size, a representative sample can be assured.

The calculated variabilities can be applied to assess "real" concentration changes in groundwater contaminants after 30 quantitative data pairs for the other contaminants have been attained to use for the calculations. This number is generally used to define a "large" data set, and the Central Limit Theorem (CLT) can then be applied. Applying the CLT means that the mean of the paired data can be assumed to be normally distributed and representative of the entire population, and statistical inferences are valid. It is expected that as more data are added to the analysis, the results will show a much smaller range that can be applied to all of the well sample data with confidence. The variability results reported here can be applied, but the user must be aware of the limitation imposed by the small sample sizes.

To ensure that adequate information is available to complete this statistical analysis in the future, it is recommended that both laboratory and field duplicate samples be selectively collected from wells that have historically shown quantitative levels of contaminants, and that the wells be selected to cover a range of concentrations. In addition, it would be useful to perform laboratory duplicate analyses on the same wells as the field duplicates in order to better assess how analytical processes contribute to the total variability. For these "nested duplicates," the analytical variability can be quantified as a component of the total variability.

5.0 TREND ANALYSIS BY AREA

Once the sampling and analytical variability in the concentration of contaminants from quarter to quarter has been addressed, the variability beyond this level must be addressed. The deviations due to sampling and analytical error are purely random effects. The purpose of this section is to discuss the study which was conducted to identify a deterministic component or trend in the variability. Deterministic components could include a periodic effect due to seasonal variation, a gradual change in concentrations that might be attributable to a plume of contaminants in the groundwater, or a marked decrease in concentrations due to the operation of the Area D extraction system. Thus, a trend can be natural or induced. A discussion follows of the seasonal variability, an investigation of normality for the sample data points, and the effects of the Area D extraction system.

Methods of data interpretation that were used to analyze the quarterly groundwater sample data and the results of those analyses are presented in this section. Each analysis was selected to answer a specific question related to determining the magnitude and extent of contamination. In cases where a quantitative method can be applied, such as with the analytical variability of Section 4, then that is the method of choice. Quantitative methods were employed to identify seasonal effects on groundwater contaminant concentrations, and a study to determine if the distribution of the contaminant concentrations follows a normal distribution so that standard parametric statistical methods for trend analysis or pattern recognition are applicable. However, due to the limitations in the data that will be discussed in detail, this approach is often not possible; in these cases, a qualitative approach was chosen.

Semi-quantitative or qualitative methods were used to evaluate the effectiveness of the Area D extraction system. The results of these analyses are presented, and then discussed in relation to the hydrogeologic analysis presented in Section 3.0.

5.1 Seasonal Variability

Concentrations of groundwater contaminants measured in monitoring well samples may vary due to seasonal effects and effects from other factors, such as extraction or production well pumping, contaminant migration, and chemical degradation. These effects must be accounted for so that patterns or trends in contaminant concentrations might be identified, allowing better definition of the magnitude and extent of contamination (i.e., how much is present and where does it occur). Therefore, an attempt was made to determine if concentrations of analytes fluctuate solely due to seasonal effects. If it could be determined that the concentrations do decrease or increase by a certain percentage during one season of the year, then this error together with the error for sampling and analytical variability would be considered a tolerance for the contaminant concentrations. Once the tolerance (T) has been quantified, a result which is outside the interval ($\bar{X}$-T, $\bar{X}$+T) where $\bar{X}$ is the mean concentration, would need to be examined for an additional source of variability.

Methods for evaluating seasonal effects generally focus on identifying a consistent or periodic pattern, such as a decrease or increase in contaminant concentrations during dry seasons. Periodic patterns can be discerned by evaluating plots of concentrations over time after any increasing or decreasing linear trend that may be attributable to other factors (i.e., contaminant migration, chemical degradation) are removed; patterns identified in the plots can then be statistically verified. Another method used to evaluate cyclic patterns compares the mean for one quarter against the mean for the other three quarters. These two methods are the simplest for assessing seasonal effects; more advanced methods have been developed, but they require many years of data (up to 10) before seasonal trends can be reliably quantified. An example of a more advanced method is the time series analysis which is based on the auto correlation coefficient. The auto correlation coefficient is a measure of the linear association between two random variables separated by a number of time periods. For example, the auto correlation coefficient can be used to determine if the result for a particular quarter is dependent on the result of the previous quarter or the previous two quarters for a particular monitoring well. The autocorrelation coefficient is the correlation coefficient between concentrations for two different quarters for the same monitoring well. It differs from the usual correlation coefficient in that it measures dependence over time rather than distance. According to Miller and Wichern, "these auto correlation estimates can be unstable for short series and hence are ordinarily calculated only for series consisting of (approximately) 50 or more observations" (Miller and Wichern, 1977).

The limitation of the small sample size in the McClellan AFB quarterly results is compounded by the fact that the two years of available data are for years when annual rates of precipitation were well above or below normal. There was extremely high precipitation in 1986, and extremely low precipitation in 1987, and continuing into 1988. Specific precipitation data is cited in the Hydrogeologic Assessment Report prepared for Area C (E.G.&G., 1987).

Prior to applying any statistical methods several problems were identified that merit consideration. The first problem in determining seasonal variability is the limitation in the amount of data. There is a maximum of eight points which represent two years of monitoring for any well. This is the minimum number of points that should be used to begin assessment for seasonal effects using any of the commonly applied methods. The small sample size precludes the establishment of a difference in the mean of one quarter versus the other three quarters because at best there would be only two data points for each season for years of extreme high and low precipitation. Second, many of the wells in the vicinity of Area D extraction system have been influenced by pumping to such a degree that any other factors have become negligible. Third, wells located in Area C that have high levels of contamination lie near the blending and aeration ponds associated with the Industrial Wastewater Treatment Plant. Leaks in these ponds could provide a continual source of artificial recharge not influenced by seasonal precipitation. Additionally, it is reasonable to assume that time dependence, or serial correlation, from quarter to quarter affects the contaminant concentrations; that is, there is a carry-over of information from quarter to quarter and possibly a lag of two or more quarters before samples can be assumed to be independent. In other words, water samples collected from the same well for two or more consecutive quarters may actually be considered to be from the same unit of water, and do not represent separate independent samples. This time dependence can be quantified by the auto correlation coefficient discussed above, but again it will require a more extended period of sampling to accomplish.

Several steps were taken to analyze the data, their limitations, and the effect they might have on the results. Only shallow monitoring zone wells were included in this study since they would be the most likely to experience seasonal fluctuations and would respond to leaching of contaminants from the unsaturated zone. The first step taken to analyze the data for these wells was to plot contaminant levels and water levels versus time for each well (See Appendix D). These plots were qualitatively evaluated to identify any patterns that could be attributable to seasonal effects. The next step was to apply some of the previously recommended statistical techniques for quantifying seasonality. Linear trends were identified using linear regression. Linear temporal trends were removed from the data and the residual data were plotted to look for cyclical patterns. For wells that did not show any linear trends, the data were compared to the mean value by calculating the distance from the mean and plotting the results to check for cyclical patterns. This analysis was conducted to screen the available data and identify wells or areas that may be suitable for future seasonal variability analysis. Other quantitative methods may be applicable when more data are available.

5.1.1 Methodology

To increase sample size, an effort was made to group wells in close proximity to each other and consider the total number of data points as the sample size. The advantage of having a larger sample size is that even if the distribution of the population is not normal, the mean of the sample will be approximately normal if the sample size is "large" (N>30) under the Central Limit Theorem. The larger sample size would allow parametric statistical methods such as the t-test to be applied to the mean without determining the underlying distribution of the population. Based on this reasoning, the following groups of shallow monitoring zone wells were designated (Plate 1):

- Group 1 - MW-27S, MW-67, MW-68;
- Group 2 - MW-23S, MW-41S, MW-1021;
- Group 3 - MW-21S, MW-33S, MW-61, MW-128, MW-131;
- Group 4 - MW-20S, MW-36S, MW-44S;
- Group 5 - MW-1002, MW-1004, MW-1005; and
- Group 6 - MW-106, MW-1019, MW-1029.

The same statistical methods were applied to these groups as were applied to each individual well. However, the validity of considering neighboring wells together was questionable because such a sample would not be independent and random if the results from wells near each other embody redundant information. Therefore, the conclusion was that the grouping of wells is not a valid approach and the remainder of the discussion will focus on the individual wells from each group.

As described above, graphs for the individual wells showing the water level and the contaminant concentrations over time were produced. The most common contaminant detected in samples collected from the wells is trichloroethene (TCE); therefore, most of the analysis was done with TCE data. In wells where other analytes are present, additional graphs showing those compounds were produced.

The next step was to detect any linear trend in contaminant concentrations over time. A simple linear regression with the sample date as the independent variable and TCE concentrations as the dependent variable was used to establish the linear trend. If a definite linear trend was established, it was subtracted and the residuals, or differences, were analyzed for cyclical patterns by plo**ing and inspecting a graph of the residuals in relation to the.mean concentration over time.

From examination of the water-level and contaminant graphs, it was hypothesized that water levels might influence the concentration of the contaminant. A few of the graphs showed an apparent negative correlation; that is, the concentration of the TCE decreased as the water level increased. To determine if a significant correlation exists for these wells, a simple linear regression was performed with the water level as the independent variable and TCE concentration as the dependent variable. If an adequate linear model could be found for the TCE as a function of the water level, then a conclusion might be that TCE concentration fluctuates seasonally in relation to recharge or the amount of rainfall.

From evaluation of the graphs, it also appeared possible that both time and water level could affect the concentrations of TCE to some degree. To assess this possibility a multiple regression model was constructed with both the sample date and the water level as independent variables and the level of TCE as the dependent variable. The multiple regression model has the potential of establishing whether time, water level, or both of these factors contribute significantly to the variability in the level of TCE, or if other factors account for most of the deviation.

5.1.2 Discussion of Statistical Methods

The method of simple linear regression requires construction of a linear model for a dependent variable as a function of an independent variable. In this case, the first model employed the sample date as the independent variable and the TCE concentration as the dependent variable. The second linear model employed the water level as the independent variable with TCE concentration as the dependent variable. The reason a linear model is constructed is to detect a general increasing or decreasing trend over time. If the regression model can be validated and the slope of the linear model can be proved statistically to be different from zero then there is a trend for concentrations for the well and that trend must be negated or removed.

Four underlying assumptions must be satisfied to validate the models: a) the underlying relationship is linear, b) independence of errors, c) constant variance, and d) normal distribution of errors. The error or residual is the difference between the predicted value of the model and the actual result from the sampling program. When plotted, these errors should show no pattern and should be randomly scattered to show independence. Also as the concentration increases, the errors should stay within the same range. If there is a consistent pattern of increasing error, then the assumption of a constant variance has been violated. The model and the residuals were examined to determine if these assumptions were violated.

If these assumptions are valid, the predicted relationship between the variables should be evaluated for how well it fits the data points. The technique for evaluating the fit involves the calculation of the F statistic and the R-Square statistic. F is the ratio of the mean square due to the model (MSR) to the mean square for pure error (MSE) or MSR/MSE. If the model is invalid, meaning that there is no linear relationship, then F will be near one. On the other hand, if there is a linear relationship, the amount of variation that can be accounted for by the model (MSR) should be greater than the residual variation (MSE). Therefore, a large F value is an indication of a valid linear model. The F statistic has a F-distribution with 1 and (n-2) degrees of freedom so that a test of the null hypothesis (i.e., there is no linear relationship) can be conducted by comparing the value of the F ratio with the appropriate percentage point of the F (1, n-2) distribution. If F exceeds this point, the linear model can be assumed to be valid. Also, the R-Square statistic (a ratio of the sum of squares due to linear regression to the total sum of squares of the data points) is an indication of the adequacy of a linear model. If the model fits the data adequately, R-Square should be near one, indicating that R-Square multiplied by 100 percent of the variability in the concentration is explained by the linear regression.

The multiple linear regression is simply an extension of the simple linear regression; in this case, concentrations of TCE would be modeled as a function of both sample date and water level. The same assumptions apply as in the simple linear regression case. The R-Square statistic for two variables should again be examined to determine the percentage of variability explained by the model, just as with the simple regression model.

The final method of analysis for seasonal effects was a study of the individual wells for cyclical behavior. The method for this analysis involved determining the mean, XBAR, for the concentration of TCE in each well. Then the differences, Y_i, between the individual concentrations, X_i and the mean (i.e., $Y_i = X_i$ - XBAR) were plotted in reference to the line Y = 0. Graphs for each well were studied to determine if any patterns could be established, such as a number of consecutive quarters below 0 and then greater than 0 for a length of time, possibly continuing in a periodic manner.

5.1.3 Results

No obvious patterns for the levels of contaminants were indicated in the graphs of water level versus concentration. In most cases, the concentrations fluctuate markedly from quarter to quarter. However, in almost all cases there was a high concentration peak during the Third Quarter 1987, and levels have been decreasing since that time. Reexamination of the QA/QC data for the Third Quarter of 1987 indicates that there were no abnormal results which could discount the validity of these data points. In addition, during 1985 and 1986, samples were not collected during the third quarter of the year. Only in 1987 has Radian collected samples during the third quarter. It is possible that an increase in concentrations of contaminants may occur during this time of year. If this is the case, Radian will evaluate this occurrence in the next informal technical report.

The details of the results of all statistical methods applied will be discussed by the groups (area) described in Section 5.1.1 for the purposes of organization and discussion.

Group 1 contains three shallow zone monitoring wells from Area A (MW-27S, MW-67, and MW-68). MW-27S was sampled only once during 6/85 before becoming dry and contained TCE at a concentration of 63 ug/L. Contaminants were not detected in MW-67 and MW-68. Thus, no statistical methods were carried out for these wells because there were no data points to evaluate.

Group 2 contains three shallow zone monitoring wells from Area B (MW-23S, MW-41S, and MW-1021). MW-23S was sampled only once during 6/85 and showed a level of 2.70 ug/L for TCE. MW-41S showed a significant positive linear trend over time, as depicted in Figure 5-1, indicating a steady increase in the level of TCE. The F value is 16.25 and is, therefore, highly significant. There is 99 percent confidence that the model should be accepted. The calculated R-Square was 0.73, indicating that 73 percent of the variability in the data can be accounted for by the sample date. The multiple linear regression showed that the water level was not an important factor to include in the model. Therefore, the predicted value from the simple linear regression was subtracted from the actual value of the TCE in analyzing this well. The third well in this group, MW-1021, showed a moderate correlation between the level of TCE and sample date in Figure 5-1. The R-Square for MW-1021 is .57 and the F value is 5.49. Thus, the linear model is valid at the 90-percent confidence level. However, the trend for this well is decreasing.

In the study of these wells individually, the plots of the residuals were examined for patterns (Figure 5-2). MW-1021 has only six data points while MW-41S has eight. No pattern can be clearly established with so few points, but these wells are recommended for future analysis for periodic behavior.

Group 3 consists of five wells in the southern part of Area C, MW-21S, MW-33S, MW-61, MW-128, and MW-131. Individual analysis showed that none of these wells exhibit significant linear trends in relation to either time or water level, therefore, the data points were not adjusted before plotting the differences from the mean. Four of the wells, MW-21S, MW-33S,

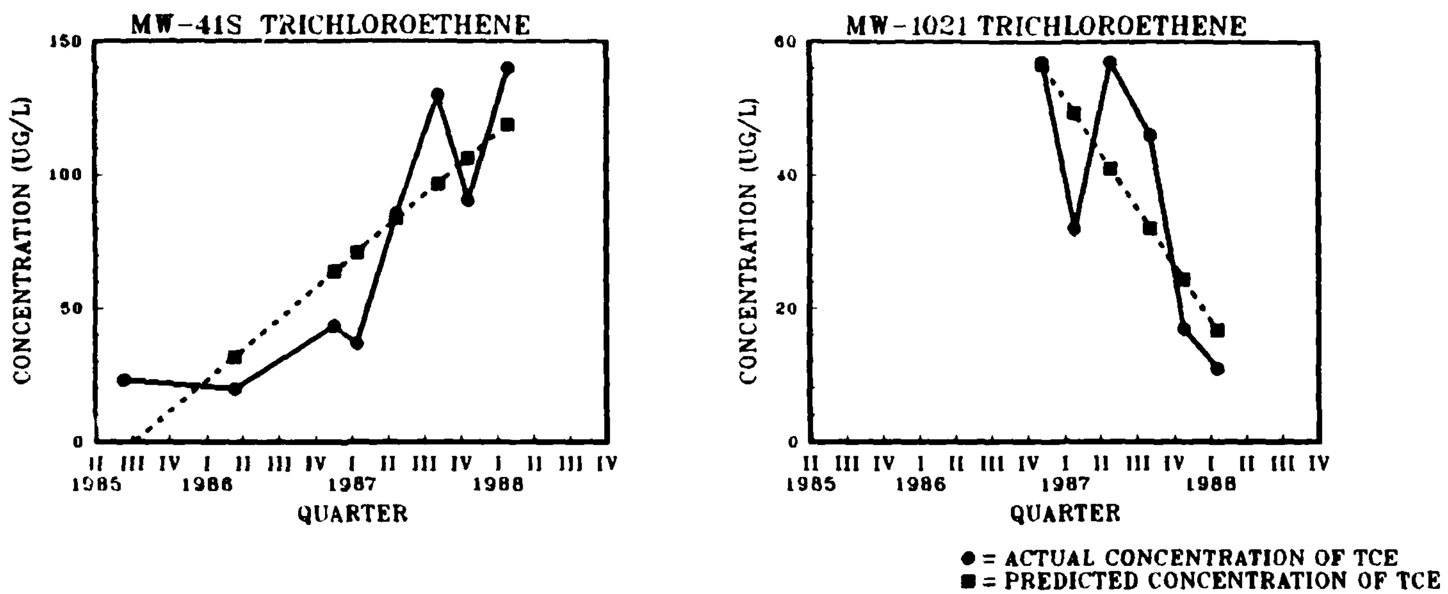

Figure 5-1. Results of Simple Linear Regression for Monitoring Wells MW-41S & MW-1021 Showing Increasing & Decreasing Trends

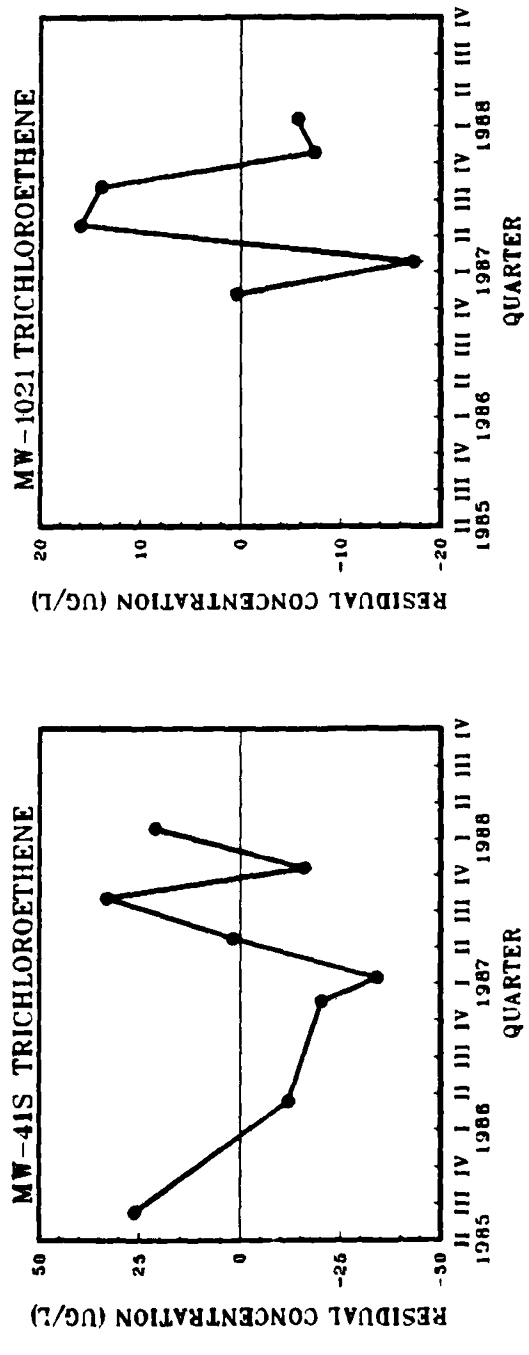

Figure 5-2. Graphs of the Difference Between Predicted & Sample Results for Monitoring Wells MW-41S & MW-1021

MW-128, and MW-131, had an unusually high concentration peak during the Third Quarter 1987 as shown in Figure 5-3. Thus, if that peak was due to analytical or sampling artifacts, the mean could be artificially high and any cyclical pattern might be overlooked. To test this possibility, the Third Quarter 1987 data point was removed, the mean and differences were recomputed, and the data were plotted again. No patterns were evident, although some seasonal trend might be established when more data are available. MW-33S and MW-128 have high levels of TCE and should be analyzed for trends again when data from subsequent quarterly sampling efforts become available. From the plot of water level and concentration of TCE, it appears that the water level and TCE concentrations follow similar curves for some quarters. However, the regression analysis with water level as the independent variable shows no significant correlation. The R-square value is only .07 meaning that only 7% of the variation in the concentration of TCE can be accounted for by the variation in water level. The residual plots for these two wells are included in Figure 5-4.

Of the three Area C wells in Group 4, MW-20S was sampled only twice while MW-36S and MW-44S have been sampled seven times each. TCE appeared in MW-44S at low levels during the most recent two quarters but was not detected before then. No other compounds were detected in MW-44S. MW-36S also has only low levels of TCE. No linear trends were significant, but there was a peak in the Third Quarter 1987 similar to the wells previously discussed. Trichlorofluoromethane (TCFM) was also consistently present in this well and the graphs show a curve similar to that of TCE at much higher concentrations, with the point for the Third Quarter 1987 much higher than the others. The fact that the two compounds behave in a similar manner may be an indication that seasonal variation is a factor for this well. Therefore, MW-36S should be analyzed for seasonal variation in the future. The residual plot for this well is included in Figure 5-4.

Group 5 consists of three wells in the Northwest Area, MW-1002, MW-1004, and MW-1005. MW-1002 has contained only low levels of TCE up to 1.7 ug/L. MW-1004 has contained TCE ranging from 14 to 27 ug/L, while MW-1005 has

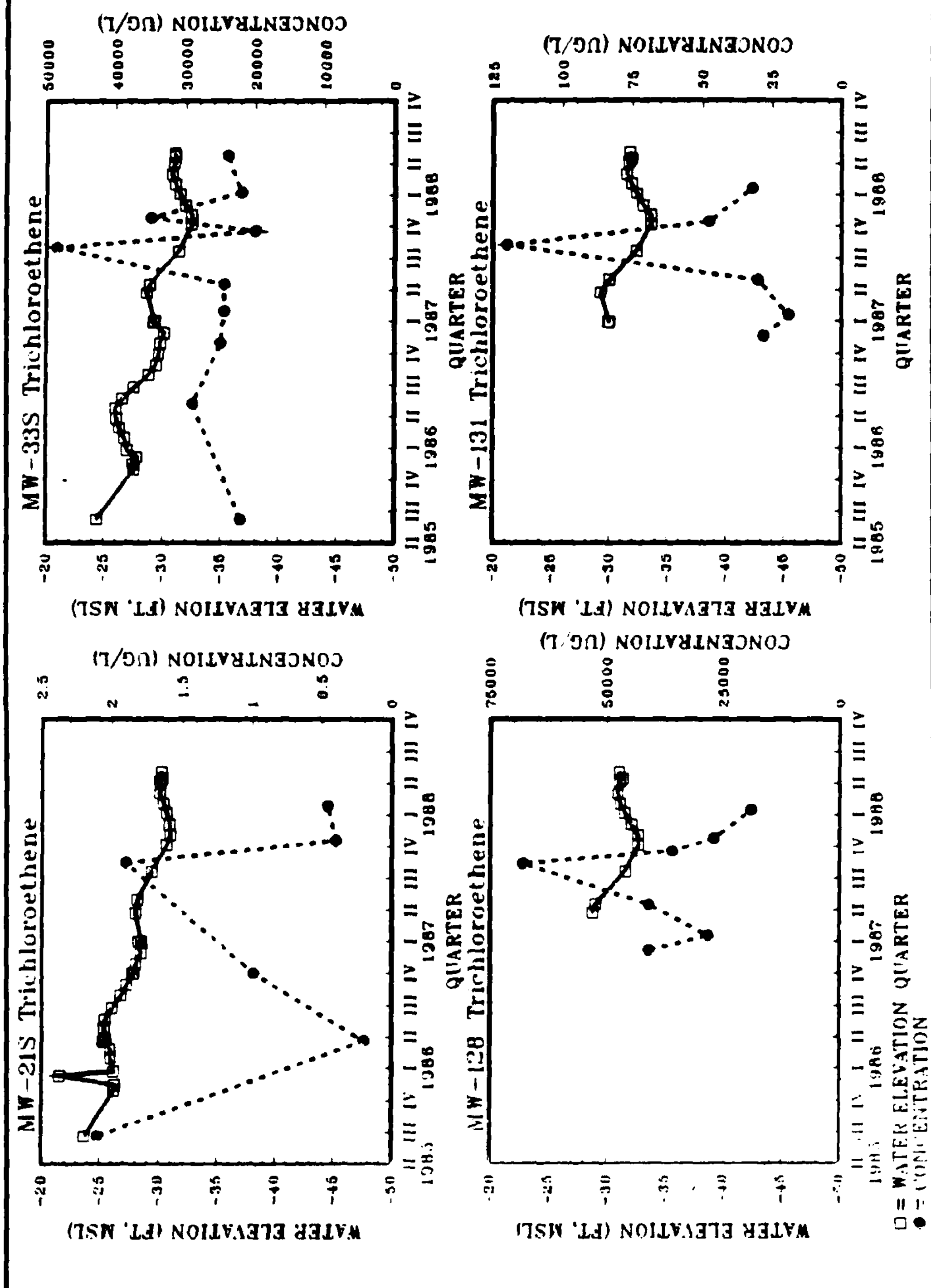

Figure 5-3. Graphs of Water Elevation & Concentrations of Trichloroethene for Area C Monitoring Wells MW-21S, MW-33S, MW-129 & MW-131, Showing Peak Concentrations for the Third Quarter of 1987

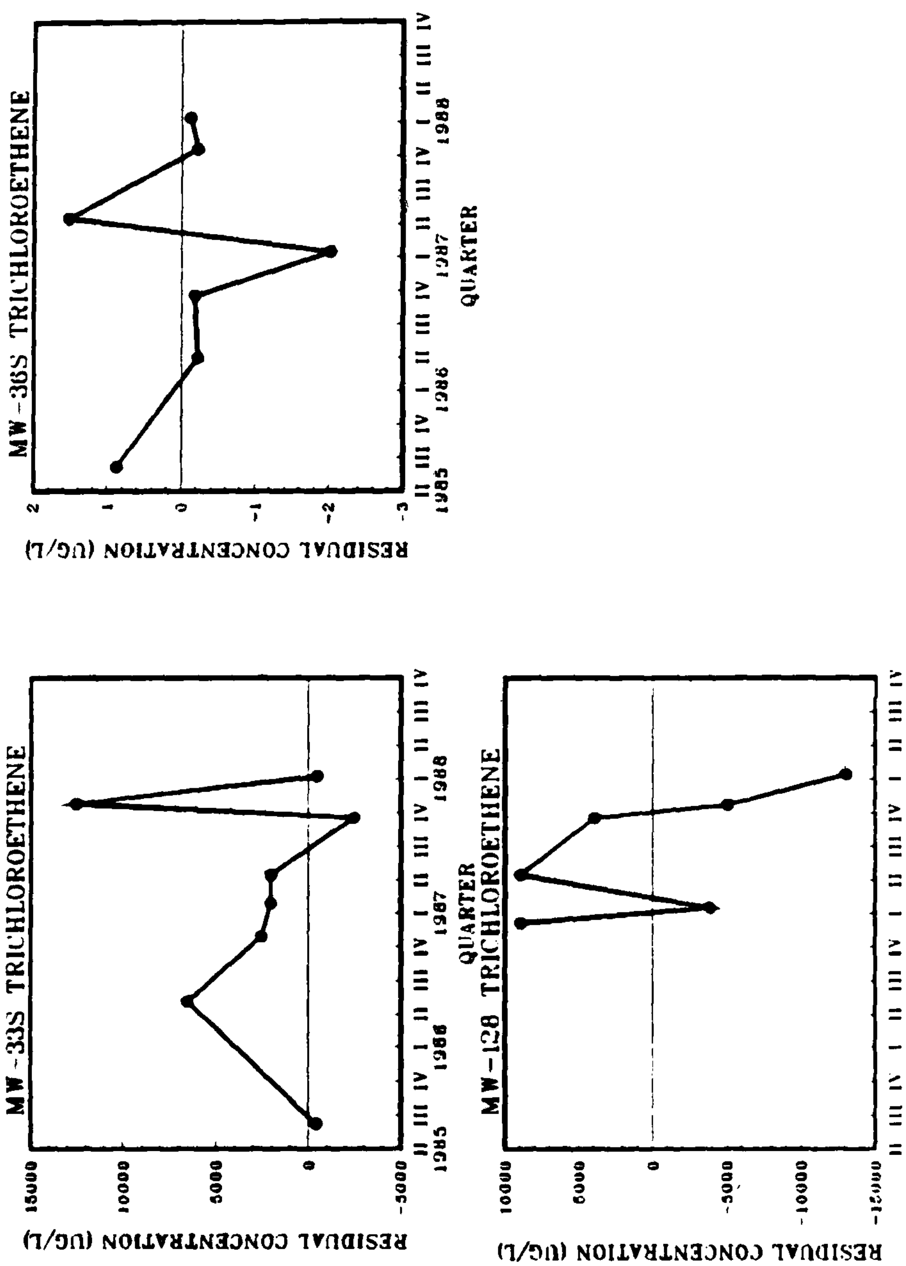

Figure 5-4. Graphs of the Difference Between the Mean Concentration & the Data Points for Monitoring Wells MW-33S, MW-36S & MW-128

contained TCE in the range of 14.5 to 100 ug/L. None of these wells shows a significant linear trend. Examination of X_i - XBAR for all of these wells seems random, indicating no apparent trends or patterns. However, graphs for TCE, 1,1-DCA, and 1,1-DCE for MW-1004; and TCE, 1,1-DCA, 1,1-DCE, 1,2-DCA, and 1,1,1-TCA for MW-1005 all exhibit a downward trend for the last three quarters. It is possible that since these wells are located in close proximity to Area D, they are affected by the extraction system. The possible effect of the Area D extraction system on these wells is discussed in Section 5.4.

Group 6 includes MW-106, located in Other On-Base Areas and MW-1019 and MW-1029 located in the Northwest Area. Contaminants have not been detected in samples collected from MW-106. The levels of TCE in MW-1019 and MW-1029 range from 0.5 to 4.3 ug/L; 1,1-DCA is also present in both wells at low concentrations. There were no significant linear trends to subtract in either well. With such low concentrations and the interval for total variability being plus or minus 31 percent, much of the variability can be accounted for by the sampling and analytical processes. However, it should be noted that these two wells seem to exhibit similar patterns of fluctuation, and seasonal variability may prove to be a factor in the future.

5.1.4 Conclusions

The major conclusion of this analysis is that if there is any seasonal variability, the effect is largely masked by other sources of variability throughout the base. No conclusion with respect to a definite seasonal effect can be reached with the available data. In some areas of the base, wells have been identified that might indicate seasonal variation after data from subsequent quarterly sampling efforts have been collected. Among these wells are MW-41S, MW-1021, MW-33S, MW-128, MW-36S, MW-1019, and MW-1029.

No clear seasonal pattern has been established for any wells or well groupings. The linear regression showed that there is little, if any, correlation between the water level and the concentration of TCE. Only MW-41S and MW-1021 showed significant linear trends over time. It is interesting to note that these two wells are close to each other and have similar curves for water level, but exhibit opposite linear trends of concentrations of TCE.

The result of this study is that other factors outweigh the effect of seasonality on contaminant concentrations, and in fact, suggest that the seasonal factors are negligible for the majority of wells. Furthermore, for the wells that are possibly affected by seasonal changes, data from additional quarters of sampling are needed to determine conclusively that a cycle exists, and to quantify the magnitude of fluctuation so that the amount of variability due to seasonal factors can be quantified.

5.2 Investigation of Normality

A study was done to determine if the monitoring well analytical results are normally distributed and whether it would be appropriate to assess the results using traditional statistical methods such as the t-test and ANOVA (Analysis of Variance). In the future, should analytical results from one quarter appear to be higher or lower than the other three quarters for a given year, then the t-test could be applied to statistically validate that hypothesis only if the sample data set is normally distributed or if the sample data set is "large." Conversely, if no one quarter emerges as being obviously different from the other quarters, an ANOVA analysis should be performed, but again is only valid under the assumption of normality. For non-normal data, the Mann-Whitney distribution-free test should be used in place of the t-test; whereas, the Kruska-Wallis test is the distribution-free counterpart to ANOVA. According to Harris, et al., the non-parametric tests are only 86.4 percent as efficient as the parametric tests.

5.2.1 Normality Testing Methods

The null hypothesis for this test is that the analytical results represent a sample from a normal distribution. There are several methods that can be used to accept or reject this hypothesis. Since the number of samples from individual wells is small (less than 9), the analytical results were also analyzed by grouping of wells on the basis of geographic proximity, and groundwater monitoring zones. The well groups for this statistical analysis were the same as previously defined in the seasonality study except that for the normality study, wells from all monitoring zones were included and each monitoring zone was considered separately. In this statistical analysis, the method of grouping the wells was considered to be a valid approach and thus the investigation of normality was necessary to determine if parametric methods could be applied.

According to Harris et al. (1987), the best indicator of non-normality for groundwater variables is the skewness coefficient. The analysis conducted for the McClellan AFB monitoring wells also considered the measure of kurtosis, the Shapiro-Wilk Test (W), and examination of the boxplot and normal probability plot. Each of these statistics was computed using the SAS® procedure Univariate of the Statistical Application System, SAS®, Release 6.02. The contaminants 1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene were considered because these are the most prevalent compounds found on-base.

Preliminary examination of the data points indicates that a large percentage of the results are below the data reporting threshold, with high concentrations reported for some wells. Since the distribution of concentrations is skewed toward zero, a transformation of the data may be an appropriate step to achieve normality. The technique of logarithmic transformation of data is supported by the fact that many geologic variables are lognormally distributed. In some cases if the original data set is not normal, a transformation can result in a normal distribution. The logarithm transformation was considered most likely to achieve normality for the monitoring well results. Therefore, the natural log transformation for each trichloroethene data point was also tested for normality by well. To perform the transformation, each result reported as not detected was read as half the method detection limit to avoid having natural log of 0 values, then the natural logarithm of each data value was computed, and the resulting data set was analyzed for normality for each individual well.

The study of the groups of wells suggested another means of relating the results obtained for one well to the results obtained for another well. A standardizing technique was attempted in which the analytical results for each well were standardized to obtain a mean of zero and a standard deviation of one. Standardizing is a technique for removing location and scale attributes from a set of data. For this analysis, location and scale attributes are the range and variation of concentrations. It was our hypothesis that standardization might equalize values from wells with high concentrations to wells with only low concentrations. Similarly, in an effort to obtain normality within groups of wells, the data points for TCE for each well of the group were standardized to a mean of zero and standard deviation of one. The resulting data set was again analyzed for normality by group and groundwater zone.

5.2.2 Application of Statistical Methods

Given the distribution of the data for a well or group of wells, that is, having many values below the data reporting threshold, a departure from normality is likely to show up as a skewed distribution rather than other departures from normality. This means that the distribution is not symmetrical. For this reason, it is important to examine the skewness coefficient. The skewness coefficient is an indication of the symmetry of the distribution with respect to the mean. For a normal symmetrical distribution, the skewness coefficient is zero. A negative skewness coefficient would be expected for a sample distribution with many low values and few high ones, such as those reported for the monitoring wells. The Shapiro-Wilk or W statistic must also be checked for each data set representing a well or group of wells. The W statistic is the ratio of the best estimator of the variance to the usual corrected sum of squares estimator of the variance. W always lies between zero and one with small values leading to rejection of the null hypothesis that the sample values are a random sample from a normal distribution. In other words, the larger the value of W, the higher the probability that the underlying population is normal. The probability of obtaining a higher value for W for this test is also given by the SAS® Univariate procedure.

The measure of Kurtosis is an indication of the height of the distribution. If the distribution is normal, the coefficient of Kurtosis would be equal to 3. A coefficient larger than 3 indicates the distribution is too steep to be a normal distribution, whereas a coefficient less than 3 would indicate that the curve is too flat.

The two plots that are helpful in determining departures from normality are the boxplot and the normal probability plot. The box plot or schematic plot can be useful in picturing the shape of the distribution, especially for skewed samples and for identifying outliers. A box is drawn such that the bottom and top edges are located at the 25th and 75th percentiles. A horizontal line is drawn at the sample median, and a plus sign is drawn at the sample mean. Vertical lines extend from either end of the box as far as the data extend or to at most 1.5 interquartile (range between 25th and 75th percentiles) ranges, whichever is less. More extreme values are marked with zero if they are within three interquartile ranges, or with an asterisk if still more extreme. Theoretically, the plot should appear symmetrical, with the mean and median in the middle of the box, and vertical lines extending from both ends. The normal probability plot shows the expected normal values for a distribution with the same mean and standard deviation plotted versus the sample values so that obvious departures from normality are evident.

5.2.3 Results and Conclusions

None of the groups of wells presented a good fit for normal data. The predominant deviation was in the skewness coefficient, because most groups contain a large number of not detected, or zero values. The lognormal transformation was also unsuccessful. None of the groups or individual wells could be demonstrated to have a normal or lognormal distribution at the 95% confidence level for any of the contaminants. The standardizing technique also produced negative results. None of the standardized values for the groups follows a normal distribution for trichloroethene.

None of the contaminants (trichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,1-trichloroethane, and tetrachloroethene) were found to have a normal or lognormal distribution for the samples for individual wells either. More data is needed to be able to determine the distribution of these variables, or whether another transformation would be able to achieve normality.

For future reports, this analysis should be repeated since it is difficult to show that very small sample sets are normal. If the same conclusion that the data do not appear to be normal or log-normal is reached, then the distribution-free techniques should be used.

5.3 Effectiveness of the Area D Extraction System

The purpose of this section is to evaluate the effectiveness of the Area D extraction system by evaluating trends in hydrologic and analytical data with respect to time. The extraction system was initially tested in December 1986 and became fully operational in March 1987. The system consists of six extraction wells pumping at a cumulative rate of approximately 100 gallons per minute. The six wells are screened between 40 and 160 feet below the ground surface (the recognized depth of contamination in Area D). In addition to the six extraction wells, a synthetic liner and clay cap have been installed over the area of identified soil contamination in Area D. The cap was installed to prevent further leaching of contaminants from the unsaturated zone and reduce the impact to groundwater quality.

5.3.1 Data Analysis Approach

There are two sources of data that were used to identify trends and evaluate the effectiveness of the Area D extraction system: 1) water-level data, and 2) historical analytical data obtained from wells in the vicinity of Area D. Water-level data were evaluated for flow directions and gradient reversal, and the analytical data were used to assess any trend in contaminant concentration measurable in monitoring wells that could be attributed to the extraction system.

There are several monitoring wells located in the vicinity of the Area D extraction system that were used as indicators of the general aquifer behavior. Although the alluvial deposits in the area are very heterogeneous, it was assumed for the purpose of this analysis that the data from monitoring wells within Area D and the Northwest Area are indicative of behavior in the aquifer zones influenced by the extraction wells. There is a limitation to this assumption; monitoring well screened intervals are not distributed uniformly through the aquifer zones. Also, the middle zone monitoring wells are clustered to the northwest and the deep zone wells are clustered to the west.

5.3.2 Groundwater Flow

A measure of the effectiveness of the extraction system is the ability of the system to affect the groundwater flow directions and gradients in Area D. The data used in evaluating the groundwater flow were obtained from water-level measurements taken quarterly from the Fourth Quarter 1986 through the Fourth Quarter 1987 and monthly thereafter.

Observed groundwater gradients from 1986 to the present give the best indication of the changes affected by withdrawal of groundwater by the extraction system. Figures 5-5 through 5-7 and Plates 2 through 6 (located at the back of this report) illustrate the changes in groundwater gradients in each of the three monitoring zones beneath Area D. The represented water-

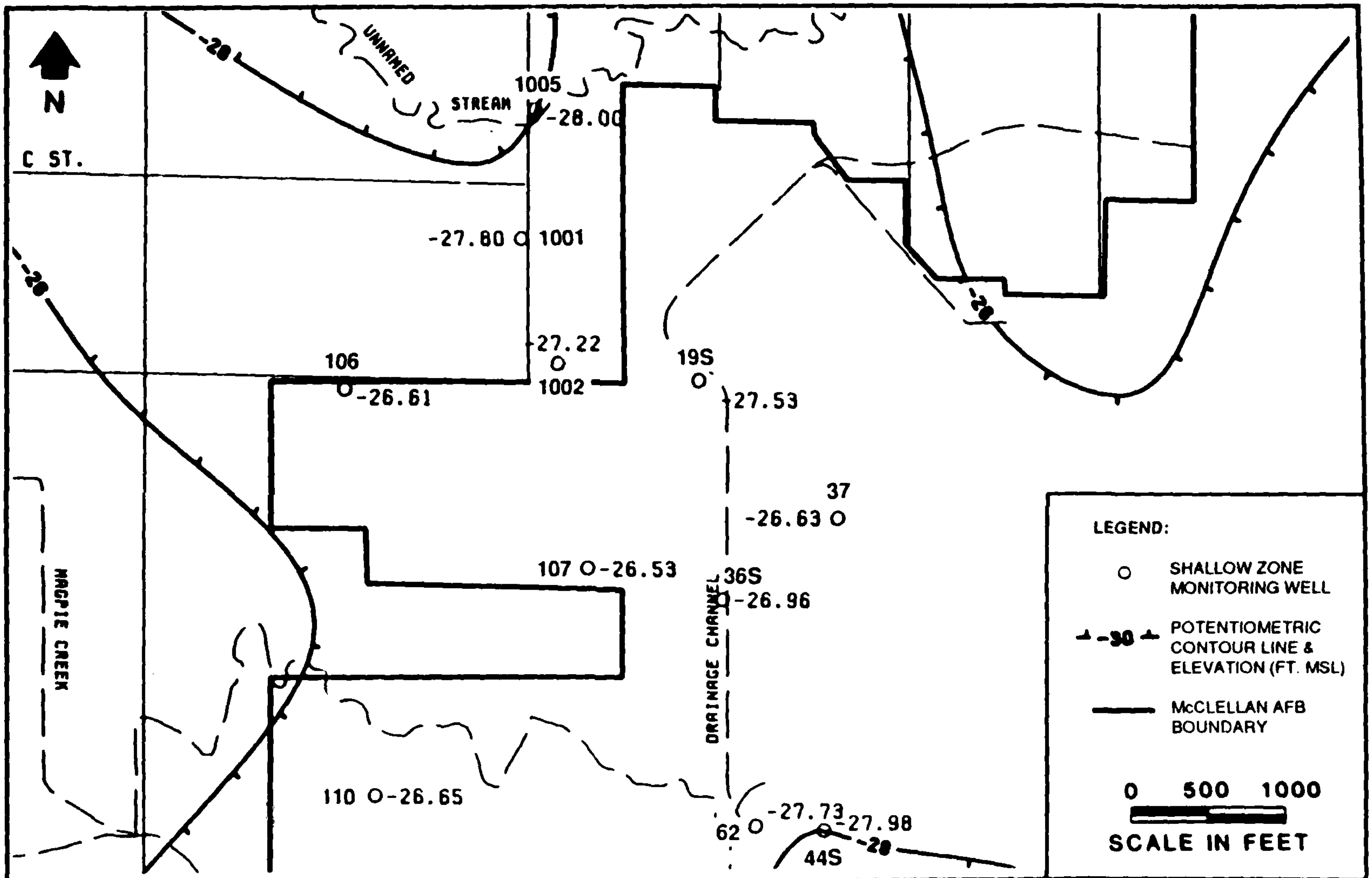

Figure 5-5. Area D Shallow Zone Potentiometric Surface Map for Data Collected During September 1986

SOURCE Radian, 1987

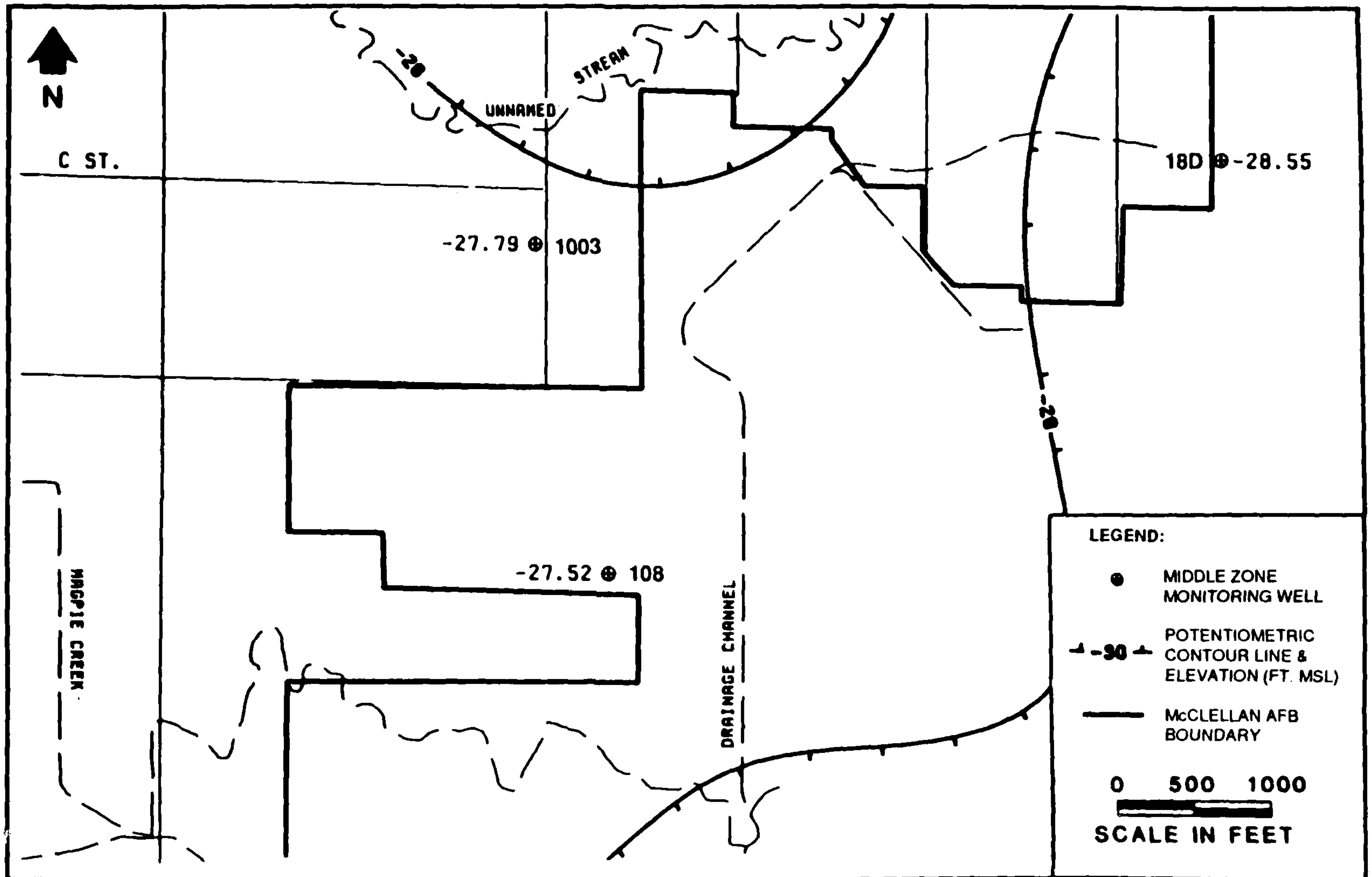

Figure 5-6. Area D Middle Zone Potentiometric Surface Map for Data Collected During September 1986

SOURCE Radian, 1987

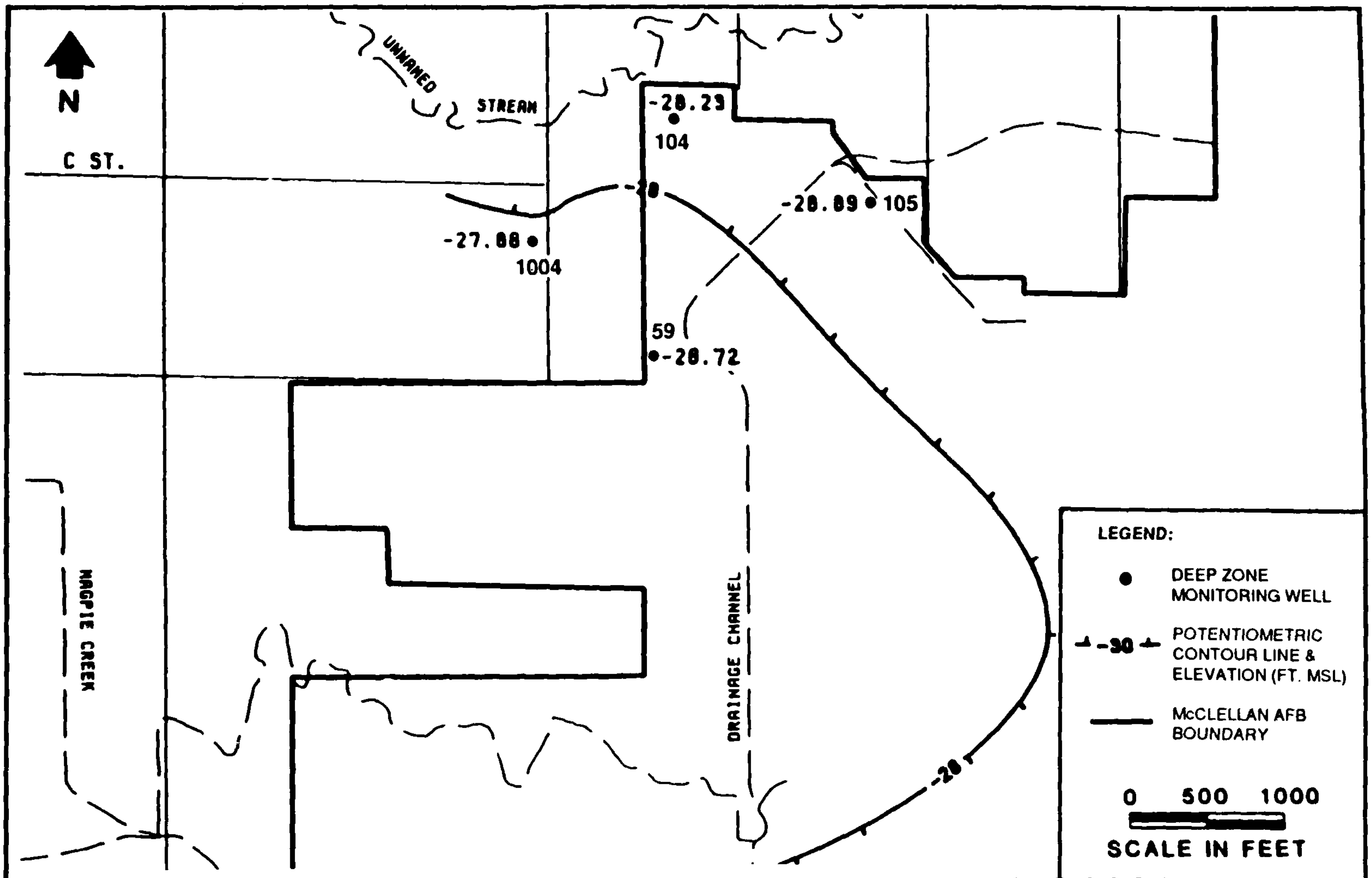

Figure 5-7. Area D Deep Zone Potentiometric Surface Map for Data Collected During September 1986

SOURCE: Radian, 1987

level data were collected in September 1986, prior to extraction of groundwater, and March 1988.

Plates 2 through 6 show that continuous pumping by the six Area D extraction wells has induced a cone of depression in each three of the monitoring zones beneath Area D. As shown on these figures, the cone of depression is more areally extensive in the shallow monitoring zone and decreases in extent with depth. As a result of the decrease in hydraulic head produced by groundwater withdrawal, the direction of groundwater flow in the Northwest Area adjacent to Area D was altered from a northwesterly flow, away from Area D prior to pumping, to a southeasterly flow toward the extraction system after pumping began. While the pumps extract contaminated groundwater from Area D, they cause a gradient reversal which creates a barrier to further migration of contaminants off base, thereby mitigating the impact of contamination to water quality in this area.

5.3.3 Concentrations of Contaminants

Results of monitoring and extraction well samples analyzed by U.S. EPA Method 601 were used for trend analysis in Area D and the Northwest Area. Among the analytes detected by this method, halogenated hydrocarbons (vinyl chloride, 1,1-DCE, 1,1-DCA, total-1,2-DCE, 1,2-DCA, 1,1,1-TCA, TCE, and PCE) are the most prevalent groundwater contaminants detected in wells at McClellan AFB. The following discussions qualitatively assess the analytical results for samples collected from the extraction wells and quantitatively assess results of analyses from nearby monitoring wells.

Analytical data in Table 5-1 show that samples collected from the Area D extraction wells since October 1987 have contained levels of some halogenated halocarbons exceeding DOHS and U.S. EPA drinking water standards. Results of other analyses are also shown but will not be used in this discussion. Concentrations of compounds detected are similar in magnitude to those detected in samples collected from adjacent shallow zone monitoring wells. Because the extraction wells are pumping groundwater with contaminants and

TABLE 5-1. ANALYTES DETECTED IN EXTRACTION WELLS LOCATED IN AREA D AND ADJACENT ON-BASE AREAS, McCLELLAN AFB

	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER EW-73	EW-73	EW-73	EW-73	EW-73	EW-73	EW-83	EW-83	EW-83	EW-83
Date Sampled			10/24/87	11/03/87	12/02/87	01/06/88	02/01/88	03/01/88	10/24/87	11/03/87	12/02/87	01/06/88
Monitoring Zone												
Field Analysis												
Lab Analysis												
U.S. EPA Method 601 (ug/l)												
Vinyl chloride	2	1	NA	2400C	2700C	NA	1400C	1500C	NA	ND	ND	NA
Methylene chloride	40	NE	NA	ND	ND	NA	1000C	ND	NA	ND	ND	NA
1,1-Dichloroethene	6	7	NA	14000C	30000C	NA	12000C	9100C	NA	660C	370C	NA
1,1-Dichloroethane	20	NE	NA	1400C	1200C	NA	1400C	1000C	NA	ND	ND	NA
Total 1,2-Dichloroethene	16	NE	NA	4000C	3900C	NA	2200C	1500C	NA	ND	ND	NA
Chloroform	100	100	NA	ND	ND	NA	ND	ND	NA	14C	ND	NA
1,2-Dichloroethane	1	5	NA	97C	106C	NA	130C	42C	NA	ND	ND	NA
1,1,1-Trichloroethane	200	200	NA	2900C	1600C	NA	2000C	1300C	NA	78C	36C	NA
Trichloroethene	5	5	NA	1300C	1100C	NA	1400C	1100C	NA	76C	44C	NA
1,1,2-Trichloroethane	100	NE	NA	ND	140C	NA	ND	ND	NA	ND	ND	NA
Tetrachloroethene	4	NE	NA	120C	81C	NA	ND	37C	NA	16C	ND	NA
1,2-Dichlorobenzene	130	NE	NA	ND	ND	NA	ND	ND	NA	ND	ND	NA
U.S. EPA Method 602 (ug/l)												
Chlorobenzene	30	NE	NA	ND	ND	NA	ND	ND	NA	ND	ND	NA
1,2-Dichlorobenzene	130	NE	NA	ND	ND	NA	ND	ND	NA	ND	ND	NA
Ethylbenzene	680	NE	NA	ND	ND	NA	ND	ND	NA	ND	ND	NA
Toluene	100	NE	NA	580C	560C	NA	880C	580C	NA	ND	ND	NA
U.S. EPA Method 624 (ug/l)												
Vinyl chloride	2	1	1100	NA	NA	1400	NA	NA	ND	NA	NA	ND
1,1-Dichloroethene	6	7	15000	NA	NA	10000	NA	NA	550	NA	NA	480
1,1-Dichloroethane	20	NE	1700	NA	NA	1200	NA	NA	ND	NA	NA	ND
Total 1,2-Dichloroethene	16	NE	2700	NA	NA	2100	NA	NA	ND	NA	NA	ND
1,2-Dichloroethane	1	5	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND
1,1,1-Trichloroethane	200	200	1400	NA	NA	1500	NA	NA	41	NA	NA	48
Trichloroethene	5	5	1400	NA	NA	1400	NA	NA	73	NA	NA	71
Benzene	.7	5	ND	NA	NA	ND	NA	NA	ND	NA	NA	ND
Toluene	100	NE	790	NA	NA	640	NA	NA	ND	NA	NA	ND
Acetone	NE	NE	13000B	NA	NA	22000	NA	NA	ND	NA	NA	ND
2-Butanone	NE	NE	4700	NA	NA	15000	NA	NA	ND	NA	NA	ND
4-Methyl-2-pentanone	NE	NE	ND	NA	NA	6100 B	NA	NA	ND	NA	NA	ND

EW = Extraction Well
ND = Nothing detected
NA = Not analyzed
B = Compound detected in laboratory blank - not edited
C = Analysis confirmed in second column analysis
NE = Not established

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER EW-73	EW-73	EW-73	EW-73	EW-73	EW-73	EW-83	EW-83	EW-83	EW-83
Date Sampled			10/24/87	11/03/87	12/02/87	01/06/88	02/01/88	03/01/88	10/24/87	11/03/87	12/02/87	01/06/88
Monitoring Zone												
Field Analysis												
Lab Analysis												
U.S. EPA Method 625 (ug/l)												
1,3-Dichlorobenzene	130	NE	5.1(6.27)	NA	NA	NA	NA	NA	ND	NA	NA	NA
1,2-Dichlorobenzene	130	NE	34	NA	NA	NA	NA	NA	ND	NA	NA	NA
1,4-Dichlorobenzene	NE	750	8.8(14.52)	NA	NA	NA	NA	NA	ND	NA	NA	NA
Di-n-butyl phthalate	NE	NE	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA
Isophorone	NE	NE	13	NA	NA	NA	NA	NA	ND	NA	NA	NA
Naphthalene	NE	NE	19	NA	NA	NA	NA	NA	ND	NA	NA	NA
Phenol	NE	NE	9.7	NA	NA	NA	NA	NA	ND	NA	NA	NA
4-Methylphenol	NE	NE	38	NA	NA	NA	NA	NA	ND	NA	NA	NA
Benzoic acid	NE	NE	200	NA	NA	NA	NA	NA	ND	NA	NA	NA
U.S. EPA Method 200.7 (mg/l)												
Arsenic	NE	0.050	0.019	NA	NA	NA	NA	NA	0.004	NA	NA	NA
Chromium	NE	0.050	ND	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Nickel	NE	NE	0.06	NA	NA	NA	NA	NA	ND	NA	NA	NA
Silver	NE	0.050	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA
Zinc	NE	NE	0.03	NA	NA	NA	NA	NA	0.06	NA	NA	NA

EW = Extraction Well
ND = Nothing detected
NA = Not analyzed
( ) = Limit of quantitation. Indicates result below limit of quantitation.
NE = Not established

RADIAN CORPORATION

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S.EPA Primary MCL	EW-83	EW-83	EW-84	WELL NUMBER EW-84	EW-84	EW-84	EW-84	EW-84	EW-84	EW-85
Date Sampled			02/01/88	03/01/88	10/24/87	11/03/87	12/02/87	01/06/88	01/06/88	02/01/88	03/01/88	10/24/87
Monitoring Zone												
Field Analysis												
Lab Analysis								LDA	LDB			
U.S. EPA Method 601 (ug/l)												
Vinyl chloride	2	1	ND	ND	NA	930C	850C	NA	NA	330C	650C	NA
Methylene chloride	40	NE	110C	ND	NA	ND	ND	NA	NA	350C	ND	NA
1,1-Dichloroethene	6	7	550C	690C	NA	1600C	1200C	NA	NA	1300C	1600C	NA
1,1-Dichloroethane	20	NE	ND	ND	NA	180C	140C	NA	NA	170C	240C	NA
Total 1,2-Dichloroethene	16	NE	ND	ND	NA	460C	390C	NA	NA	253C	290C	NA
Chloroform	100	100	ND	ND	NA	ND	ND	NA	NA	ND	ND	NA
1,2-Dichloroethane	1	5	ND	ND	NA	130C	84C	NA	NA	110C	108C	NA
1,1,1-Trichloroethane	200	200	74C	48C	NA	330C	160C	NA	NA	240C	180C	NA
Trichloroethene	5	5	60C	57C	NA	1100C	720C	NA	NA	940C	1100C	NA
1,1,2-Trichloroethane	100	NE	ND	ND	NA	ND	ND	NA	NA	ND	ND	NA
Tetrachloroethene	4	NE	8.9C	6.9C	NA	15C	ND	NA	NA	ND	ND	NA
1,2-Dichlorobenzene	130	NE	ND	ND	NA	39C	ND	NA	NA	22C	40C	NA
U.S. EPA Method 602 (ug/l)												
Chlorobenzene	30	NE	ND	ND	NA	ND	ND	NA	NA	ND	5.8C	NA
1,2-Dichlorobenzene	130	NE	ND	ND	NA	50C	ND	NA	NA	ND	50C	NA
Ethylbenzene	680	NE	ND	ND	NA	ND	ND	NA	NA	ND	3.8C	NA
Toluene	100	NE	ND	ND	NA	ND	ND	NA	NA	40C	26C	NA
U.S. EPA Method 624 (ug/l)												
Vinyl chloride	2	1	NA	NA	370	NA	NA	500	460	NA	NA	ND
1,1-Dichloroethene	6	7	NA	NA	1600	NA	NA	1200	1200	NA	NA	2200
1,1-Dichloroethane	20	NE	NA	NA	220	NA	NA	150	160	NA	NA	ND
Total 1,2-Dichloroethene	16	NE	NA	NA	310	NA	NA	250	250	NA	NA	ND
1,2-Dichloroethane	1	5	NA	NA	110	NA	NA	95	96	NA	NA	ND
1,1,1-Trichloroethane	200	200	NA	NA	190	NA	NA	180	180	NA	NA	450
Trichloroethene	5	5	NA	NA	1500	NA	NA	1100	1100	NA	NA	2400
Benzene	.7	5	NA	NA	26 B	NA	NA	ND	ND	NA	NA	ND
Toluene	100	NE	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND
Acetone	NE	NE	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND
2-Butanone	NE	NE	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND
4-Methyl-2-pentanone	NE	NE	NA	NA	ND	NA	NA	ND	ND	NA	NA	ND

EW = Extraction Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis
C = Analysis confirmed in second column analysis
ND = Nothing detected
NA = Not analyzed
B = Compound detected in laboratory blank - not edited
NE = Not established

RADIAN CORPORATION

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER EW-83	EW-83	EW-84	EW-84	EW-84	EW-84	EW-84	EW-84	EW-84	EW-85
Date Sampled			02/01/88	03/01/88	10/24/87	11/03/87	12/02/87	01/06/88	01/06/88	02/01/88	03/01/88	10/24/87
Monitoring Zone												
Field Analysis												
Lab Analysis								LDA	LDB			
U.S. EPA Method 625 (ug/l)												
1,3-Dichlorobenzene	130	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
1,2-Dichlorobenzene	130	NE	NA	NA	28	NA	NA	NA	NA	NA	NA	ND
1,4-Dichlorobenzene	NE	750	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
Di-n-butyl phthalate	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	17 B
Isophorone	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
Naphthalene	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
Phenol	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
4-Methylphenol	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
Benzoic acid	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
U.S. EPA Method 200.7 (mg/l)												
Arsenic	NE	0.050	NA	NA	0.004	NA	NA	NA	NA	NA	NA	0.004
Chromium	NE	0.050	NA	NA	ND	NA	NA	NA	NA	NA	NA	0.01
Nickel	NE	NE	NA	NA	0.04	NA	NA	NA	NA	NA	NA	ND
Silver	NE	0.050	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND
Zinc	NE	NE	NA	NA	0.11	NA	NA	NA	NA	NA	NA	0.06

EW = Extraction Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis
NE = Not established
ND = Nothing detected
NA = Not analyzed
B = Compound detected in laboratory blank - not edited

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S.EPA Primary MCL	EW-85	EW-85	EW-85	WELL NUMBER EW-85	EW-85	EW-85	EW-86	EW-86	EW-86	EW-86
Date Sampled			11/03/87	11/03/87	12/02/87	01/06/88	02/01/88	03/01/88	10/24/87	11/03/87	12/02/87	01/06/88
Monitoring Zone												
Field Analysis												
Lab Analysis			LDA	LDB								
U.S. EPA Method 601 (ug/l)												
Vinyl chloride	2	1	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
Methylene chloride	40	NE	ND	ND	ND	NA	210C	ND	NA	ND	ND	NA
1,1-Dichloroethene	6	7	2200C	2200C	1800C	NA	1200C	1600C	NA	130C	94C	NA
1,1-Dichloroethane	20	NE	14C	13C	ND	NA	13C	ND	NA	ND	ND	NA
Total 1,2-Dichloroethane	16	NE	38C	40C	ND	NA	18C	22C	NA	ND	ND	NA
Chloroform	100	100	5.2C	ND	ND	NA	ND	ND	NA	ND	ND	NA
1,2-Dichloroethane	1	5	17C	17C	ND	NA	ND	13C	NA	ND	ND	NA
1,1,1-Trichloroethane	200	200	610C	630C	410C	NA	320C	280C	NA	95C	65C	NA
Trichloroethene	5	5	1400C	1400C	1200C	NA	840C	1000C	NA	36C	36C	NA
1,1,2-Trichloroethane	100	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
Tetrachloroethene	4	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
1,2-Dichlorobenzene	130	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
U.S. EPA Method 602 (ug/l)												
Chlorobenzene	30	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
1,2-Dichlorobenzene	130	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
Ethylbenzene	680	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
Toluene	100	NE	ND	ND	ND	NA	ND	ND	NA	ND	ND	NA
U.S. EPA Method 624 (ug/l)												
Vinyl chloride	2	1	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
1,1-Dichloroethene	6	7	NA	NA	NA	1700	NA	NA	69	NA	NA	130
1,1-Dichloroethane	20	NE	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
Total 1,2-Dichloroethane	16	NE	NA	NA	NA	32	NA	NA	ND	NA	NA	ND
1,2-Dichloroethane	1	5	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
1,1,1-Trichloroethane	200	200	NA	NA	NA	400	NA	NA	32	NA	NA	86
Trichloroethene	5	5	NA	NA	NA	1700	NA	NA	24	NA	NA	66
Benzene	.7	5	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
Toluene	100	NE	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
Acetone	NE	NE	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
2-Butanone	NE	NE	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
4-Methyl-2-pentanone	NE	NE	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND
U.S. EPA Method 625 (ug/l)												
1,3-Dichlorobenzene	130	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA

EW = Extraction Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis
NE = Not established
ND = Nothing detected
NA = Not analyzed
C = Analysis confirmed in second column analysis

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S.EPA Primary MCL	EW-85	EW-85	EW-85	EW-85	EW-85	EW-85	EW-86	EW-86	EW-86	EW-86
			WELL NUMBER									
Date Sampled			11/03/87	11/03/87	12/02/87	01/06/88	02/01/88	03/01/88	10/24/87	11/03/87	12/02/87	01/06/88
Monitoring Zone												
Field Analysis												
Lab Analysis			LDA	LDB								
U.S. EPA Method 625 (ug/l)												
1,2-Dichlorobenzene	130	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
1,4-Dichlorobenzene	NE	750	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Di-n-butyl phthalate	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Isophorone	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Naphthalene	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Phenol	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
4-Methylphenol	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Benzoic acid	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
U.S. EPA Method 200.7 (mg/l)												
Arsenic	NE	0.050	NA	NA	NA	NA	NA	NA	0.004	NA	NA	NA
Chromium	NE	0.050	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA
Nickel	NE	NE	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Silver	NE	0.050	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Zinc	NE	NE	NA	NA	NA	NA	NA	NA	0.09	NA	NA	NA

EW = Extraction Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis
ND = Nothing detected
NA = Not analyzed
NE = Not established

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S.EPA Primary MCL	EW-86	EW-86	EW-87	WELL NUMBER EW-87	EW-87	EW-87	EW-87	EW-87	EW-87	EW-87
Date Sampled			02/01/88	03/01/88	10/24/87	10/24/87	10/24/87	11/03/87	12/02/87	01/06/88	02/01/88	03/01/88
Monitoring Zone												
Field Analysis												
Lab Analysis						LDA	LDB					
U.S. EPA Method 601 (ug/l)												
Vinyl chloride	2	1	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
Methylene chloride	40	NE	11C	ND	NA	NA	NA	12C	ND	NA	7.6C	ND
1,1-Dichloroethene	6	7	150C	150C	NA	NA	NA	56C	41C	NA	82C	92C
1,1-Dichloroethane	20	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
Total 1,2-Dichloroethene	16	NE	ND	ND	NA	NA	NA	9C	ND	NA	0.93C	1.1C
Chloroform	100	100	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
1,2-Dichloroethane	1	5	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
1,1,1-Trichloroethane	200	200	72C	80C	NA	NA	NA	2.6C	ND	NA	2.4C	3.0C
Trichloroethene	5	5	53C	61C	NA	NA	NA	9.3C	8.2C	NA	16C	23C
1,1,2-Trichloroethane	100	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
Tetrachloroethene	4	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
1,2-Dichlorobenzene	130	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
U.S. EPA Method 602 (ug/l)												
Chlorobenzene	30	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
1,2-Dichlorobenzene	130	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
Ethylbenzene	680	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
Toluene	100	NE	ND	ND	NA	NA	NA	ND	ND	NA	ND	ND
U.S. EPA Method 624 (ug/l)												
Vinyl chloride	2	1	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
1,1-Dichloroethene	6	7	NA	NA	40	NA	NA	NA	NA	48	NA	NA
1,1-Dichloroethane	20	NE	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
Total 1,2-Dichloroethene	16	NE	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
1,2-Dichloroethane	1	5	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
1,1,1-Trichloroethane	200	200	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
Trichloroethene	5	5	NA	NA	8.5	NA	NA	NA	NA	16	NA	NA
Benzene	.7	5	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
Toluene	100	NE	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
Acetone	NE	NE	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
2-Butanone	NE	NE	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
4-Methyl-2-pentanone	NE	NE	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA
U.S. EPA Method 625 (ug/l)												
1,3-Dichlorobenzene	130	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA

EW = Extraction Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis
NE = Not established
ND = Nothing detected
NA = Not analyzed
C = Analysis confirmed in second column analysis

TABLE 5-1. (CONTINUED)

	DOHS Action Level	U.S. EPA Primary MCL	WELL NUMBER EW-86	EW-86	EW-87	EW-87	EW-87	EW-87	EW-87	EW-87	EW-87	EW-87
Date Sampled			02/01/88	03/01/88	10/24/87	10/24/87	10/24/87	11/03/87	12/02/87	01/06/88	02/01/88	03/01/88
Monitoring Zone												
Field Analysis												
Lab Analysis						LDA	LDB					
U.S. EPA Method 625 (ug/l)												
1,2-Dichlorobenzene	130	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NE	750	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Isophorone	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Phenol	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Benzoic acid	NE	NE	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
U.S. EPA Method 200.7 (mg/l)												
Arsenic	NE	0.050	NA	NA	NA	0.005	0.004	NA	NA	NA	NA	NA
Chromium	NE	0.050	NA	NA	NA	0.02	0.02	NA	NA	NA	NA	NA
Nickel	NE	NE	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA
Silver	NE	0.050	NA	NA	NA	ND	0.007	NA	NA	NA	NA	NA
Zinc	NE	NE	NA	NA	NA	0.07	0.07	NA	NA	NA	NA	NA

EW = Extraction Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis
ND = Nothing detected
NA = Not analyzed
NE = Not established

concentrations equivalent to these detected in shallow monitoring wells, it may be concluded that the extraction system is removing contaminants from the shallow monitoring zone.

Figures 5-8 through 5-16 show the concentrations of various compounds measured in nearby monitoring wells over the period from the Fourth Quarter 1986 to the First Quarter 1988. Data in the figures indicate that most of the monitoring wells showed a distinct decreasing trend in concentrations over this time period. Some monitoring wells show less distinct trends than others, but the overall trend is clearly toward decreasing concentrations.

Several of the shallow zone monitoring wells located in the southern portion of Area D and in the Northwest Area do not show a consistent decrease (Figures 5-8 through 5-11). MW-91 shows a definite decrease in the concentration of 1,1-dichloroethane, whereas the data for trichloroethene are somewhat erratic.

The middle zone monitoring wells in Area D (MW-54 and MW-55) show definite decreasing concentrations for all analytes (Figures 5-12 through 5-14). In this zone, all the detected analytes exhibit similar patterns in contaminant concentrations.

The deep zone monitoring wells in Area D (MW-58 and MW-59) also show decreasing concentration trends (Figures 5-15 and 5-16). The concentrations from MW-58 for 1,1,1-trichloroethene and trichloroethene exhibit increasing trends until the Third Quarter 1987 after which a sharp decreasing trend is observed. As mentioned previously in Section 4.0, this increase may be an artifact of the sampling or analytical processes during the Third Quarter 1987.

Table 5-2 lists the percentage change and the absolute change in concentration for several contaminants over the time period studied for monitoring wells located in Area D and the Northwest Area. In many cases, the

TABLE 5-2. ABSOLUTE AND PERCENTAGE CHANGES IN CONTAMINANT CONCENTRATIONS FOR MONITORING WELLS LOCATED IN AREA D AND ADJACENT ON-BASE AREAS AND THE NORTHWEST AREA (INITIAL DATE OF SAMPLING THROUGH THE FIRST QUARTER 1988)

Monitoring Well Number	Initial Sampling Date	Compound	Absolute Change (ug/L)	DOHS Action Level (ug/L)	Percentage Change (%)
AREA D AND ADJACENT ON-BASE AREAS:					
Shallow Monitoring Zone:					
MW-91	01/20/87	1,1-Dichloroethene	14.0 to 1.3	6	-90
		Trichloroethene	9.9 to 6.6	5	-33
MW-92	01/20/87	Trichloroethene	6.2 to 4.4	5	-29
Middle Monitoring Zone:					
MW-54	11/20/86	Vinyl chloride	1,200 to 5.0	2	-100
		1,1-Dichloroethene	430 to 8.5	6	-98
		1,1-Dichloroethane	1,400 to 2.9	20	-100
		1,2-Dichloroethane	38 to 0.17	1	-100
		Trichloroethene	9 to 1.8	5	-80
MW-55	11/22/86	1,1-Dichloroethene	210 to 33	6	-84
		1,1-Dichloroethane	14 to 3.7	20	-76
		Trichloroethene	110 to 11	5	-89
Deep Monitoring Zone:					
MW-58	01/19/87	1,1,1-Trichloroethane	2.3 to 0.25	200	-89
		Trichloroethane	1.4 to 0.12	5	-100
MW-59	11/18/86	1,1-Dichloroethene	270 to 3.1	6	-99
		1,1,1-Trichloroethane	19 to 0.21	200	-99
		Trichloroethene	290 to 2.3	5	-99
NORTHWEST AREA:					
Shallow Monitoring Zone:					
MW-1002	11/07/85	1,1-Dichloroethene	2.4 to 0.96	6	-60
		Trichloroethene	1.1 to 0.39	5	-65
MW-1004	12/18/85	1,1-Dichloroethene	120 to 23	6	-81
		1,1-Dichloroethane	11 to 1.6	20	-85
		1,1,1-Trichloroethane	2.1 to 0.6	200	-71
		Trichloroethene	14 to 3.6	5	-74

(Continued)

TABLE 5-2.

Monitoring Well Number	Initial Sampling Date	Compound	Absolute Change (ug/L)	DOHS Action Level (ug/L)	Percentage Change (%)
NORTHWEST AREA:					
Shallow Monitoring Zone:					
MW-1005	12/17/85	1,1-Dichloroethene	160 to 58	6	-64
		1,1-Dichloroethane	41 to 5.2	20	-87
		1,2-Dichloroethane	5 to 2.2	1	-56
		Trichloroethene	100 to 15	5	-85

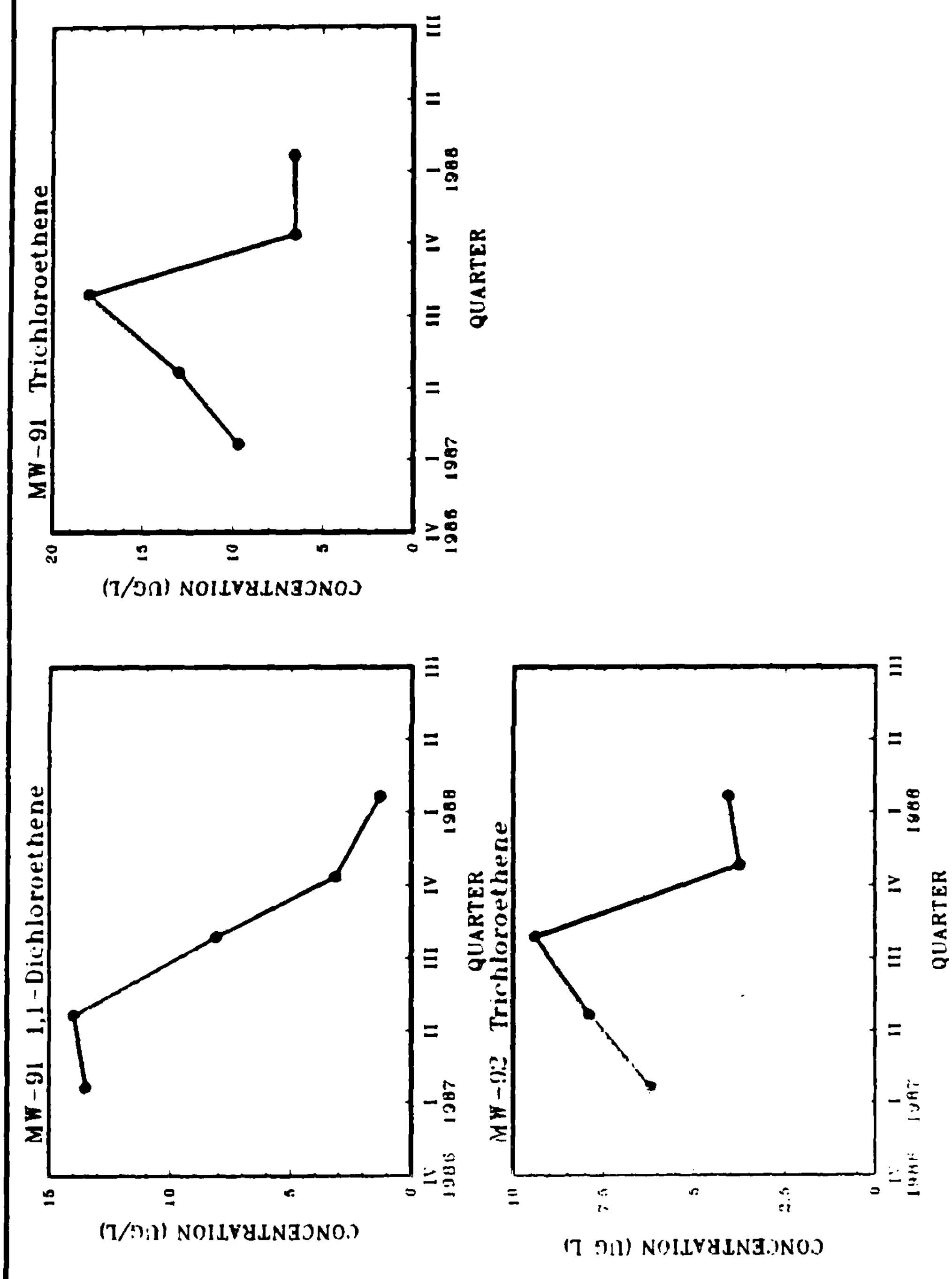

Figure 5-8. Time Series Plots of 1,1-DCE & TCE for Shallow Zone Monitoring Wells MW-91 & MW-92 Located in Area D

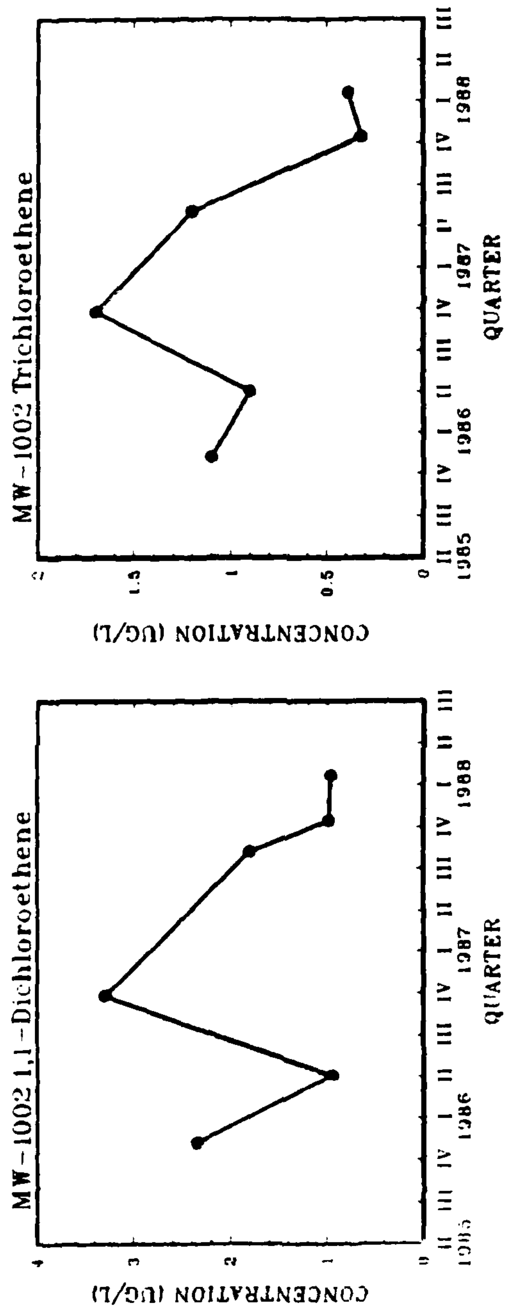

Figure 5-9. Time Series Plots of 1,1-DCE & TCE for Shallow Zone Monitoring Well MW-1002 Located in the Northwest Area

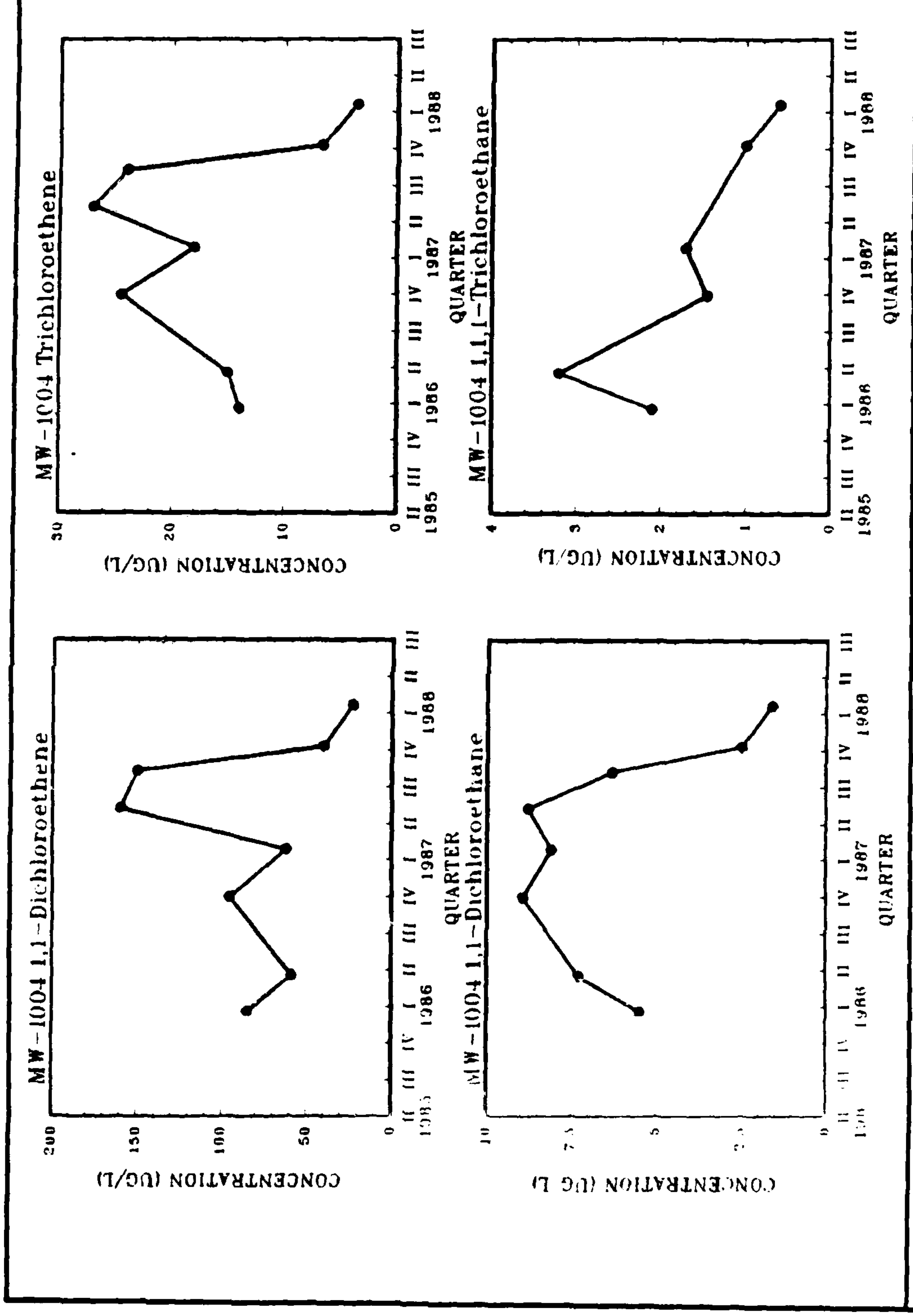

Figure 5-10. Time Series Plots of 1,1-DCE, 1,1-DCA, TCE, & 1,1,1-TCA for Shallow Monitoring Zone Well MW-1004 Located in the Northwest Area

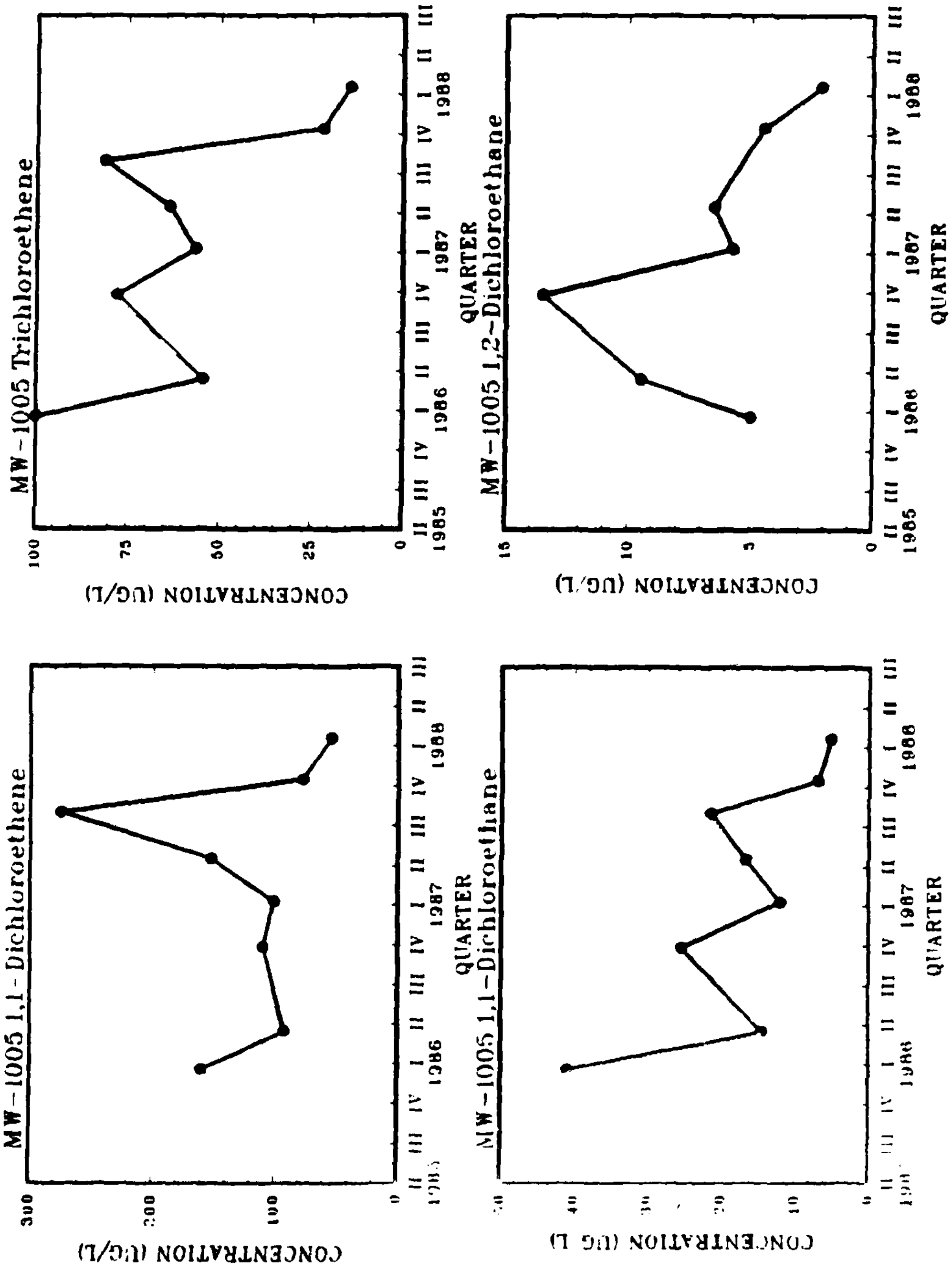

Figure 5-11. Time Series Plots of 1,1-DCE, 1,1-DCA, TCE, & 1,2-DCA for Shallow Zone Monitoring Well MW-1005 Located in the Northwest Area

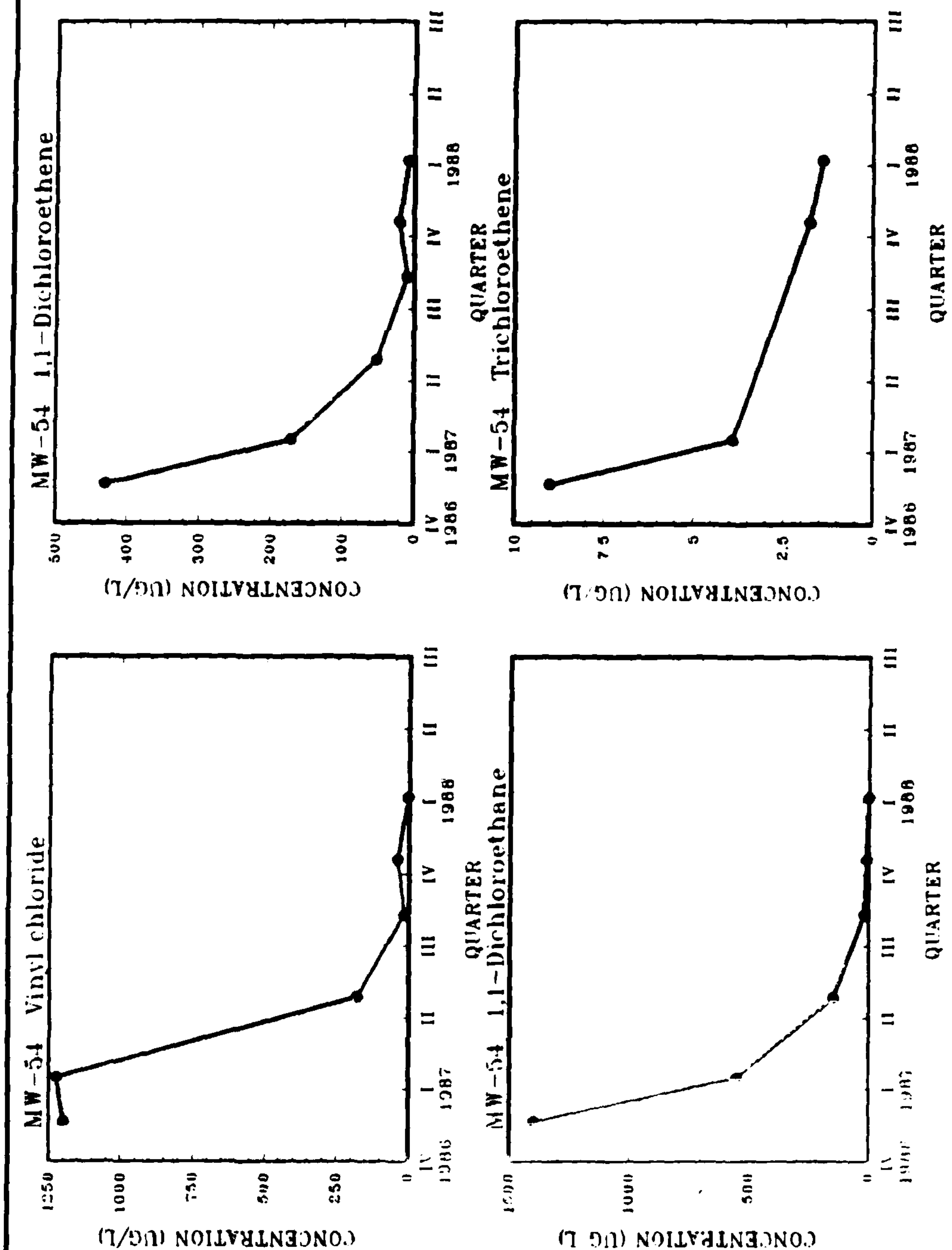

Figure 5-12. Time Series Plots of Vinyl Chloride, 1,1-DCA, 1,1-DCE, & TCE for Middle Monitoring Zone Well MW-54 Located in Area D

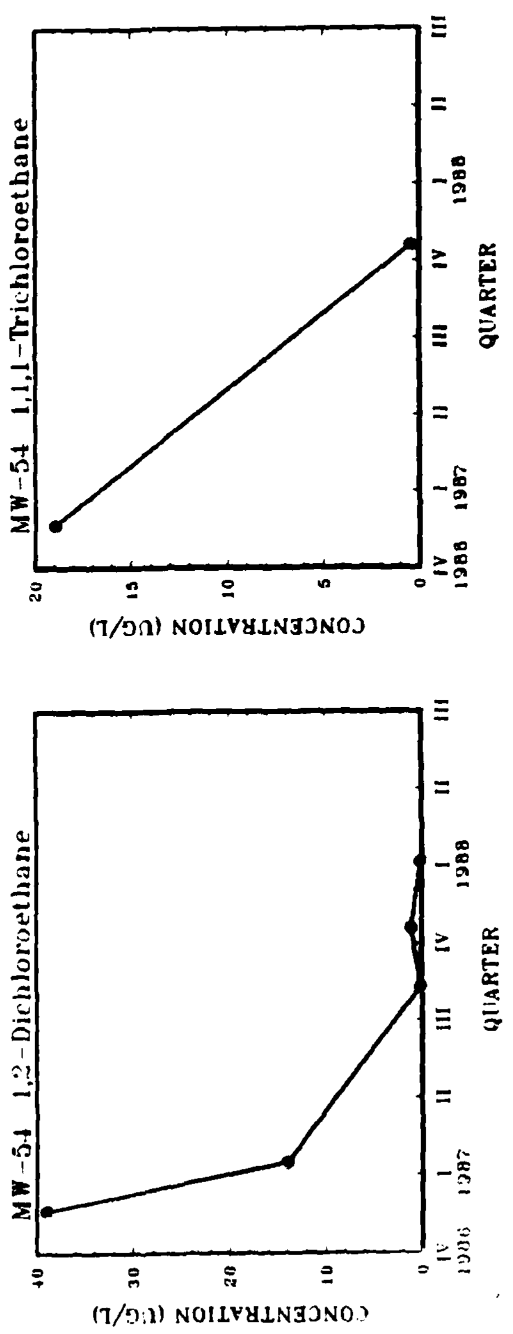

Figure 5-13. Time Series Plots of 1,2-DCA & 1,1,1-TCA for Middle Monitoring Zone Well MW-54 Located in Area D

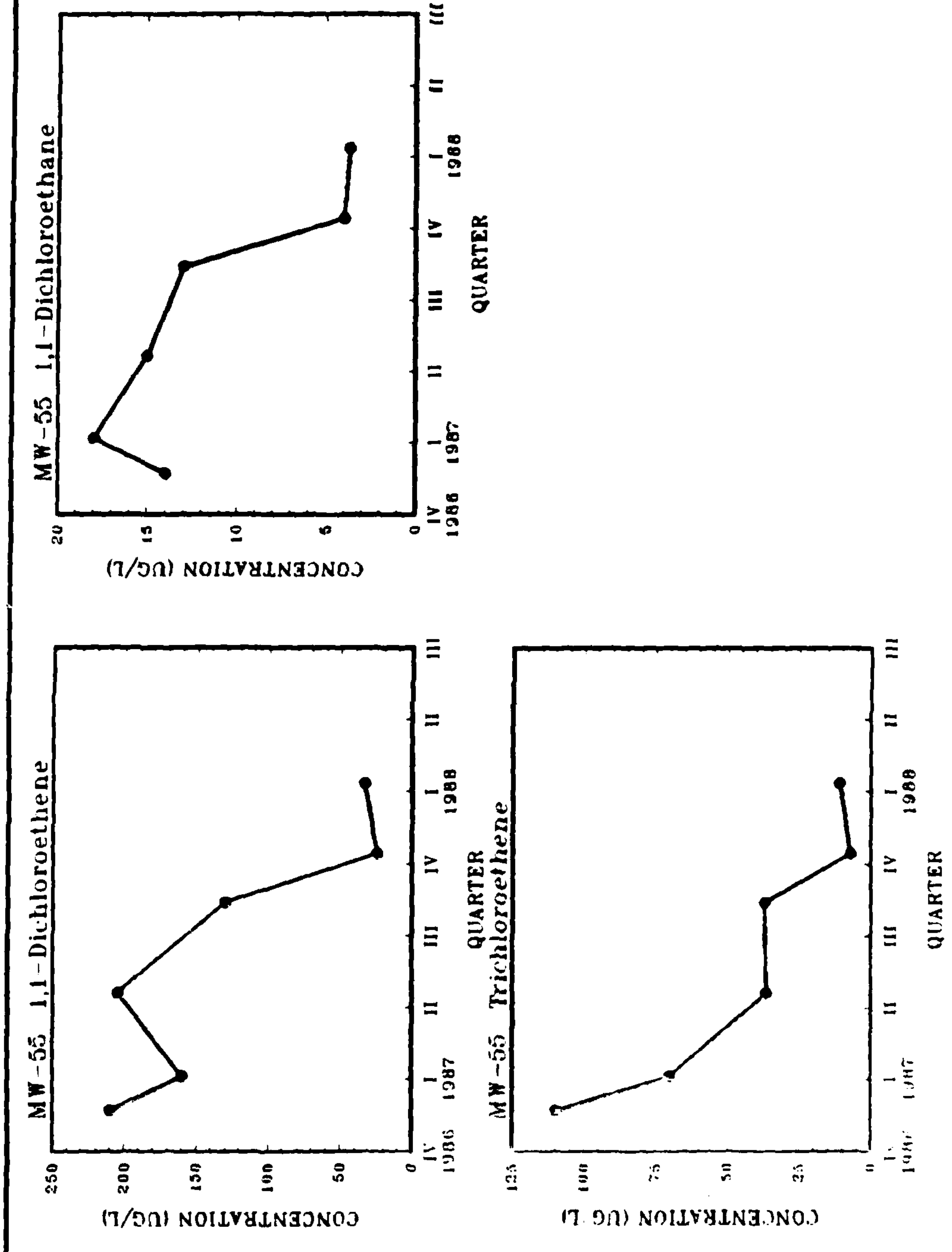

Figure 5-14. Time Series Plots of 1,1-DCE, TCE, & 1,1-DCA for Middle Zone Monitoring Well MW-55 Located in Area D

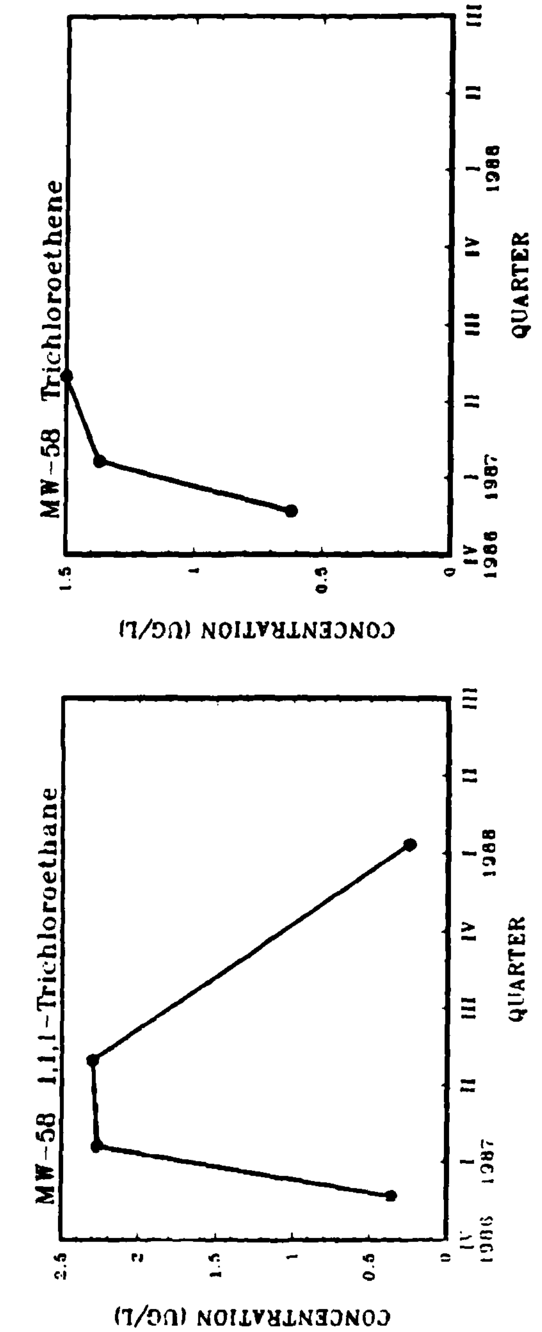

Figure 5-15. Time Series Plots of 1,1,1-TCA & TCE for Deep Zone Monitoring Well MW-58 Located in Area D

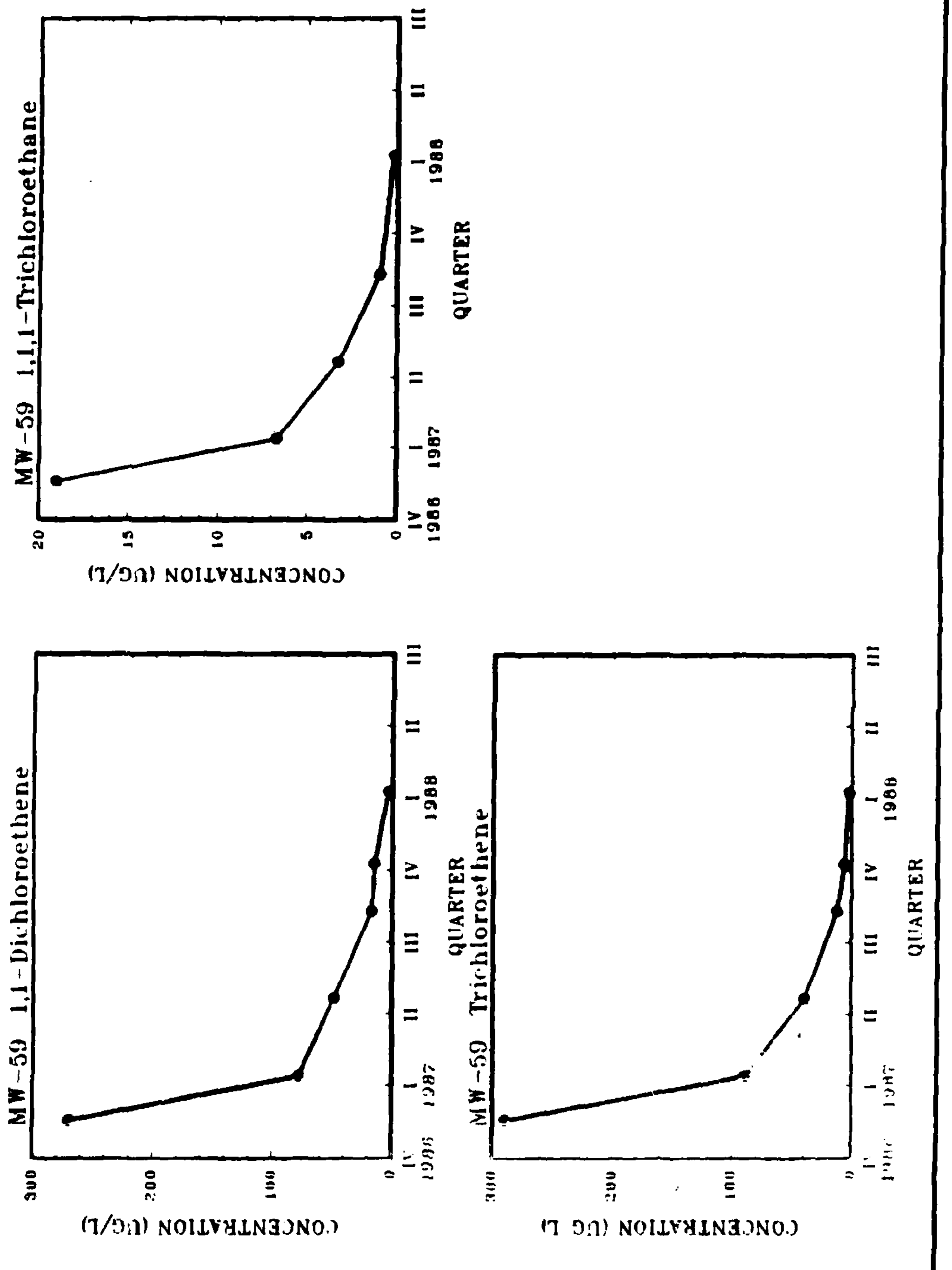

Figure 5-16. Time Series Plots of 1,1-DCE, TCE, & 1,1,1-TCA for Deep Zone Monitoring Well MW-59 Located in Area D

contaminant concentrations have been reduced to below DOHS action levels. The column listing the absolute concentration change contains analytical results from the initial time the well was sampled on the left, and the analytical results from First Quarter 1988 on the right. The percentage change was calculated as the difference between the two values in the absolute value column divided by the higher value and multiplied by 100. The percentage change values in the table indicate the relative change for the contaminants assessed. These values show that the detected contaminants exhibited a marked decrease in concentration over the period the extraction system has been in operation.

5.3.4 Conclusion

Based on the above evaluation of data, it appears that the extraction system is withdrawing groundwater contaminated with several halogenated hydrocarbons and is controlling groundwater flow in the three groundwater monitoring zones beneath and to the west of Area D. In little more than a year, concentrations have been reduced by 70 to 100 percent for most contaminants. Many of the contaminant levels in the monitoring wells are now at or below the DOHS action levels. It is expected that further decreases in contaminant concentrations will occur as the system continues to operate.

6.0 RECOMMENDATIONS

Recommendations based on analytical and hydrologic data acquired through the First Quarter 1988 are presented below.

Additional tasks are planned for the ongoing RI/FS to address several of the data limitations presented in this report (installation of additional monitoring wells, vadose zone characterization, site characterization, etc.). Therefore, specific recommendations that would be helpful for this study that will be addressed in these other RI/FS activities are not presented in this section.

1) **Recommendation:** Collect groundwater samples from MW-25D located in Area A and Adjacent On-Base Areas and analyze for the presence of U.S. EPA Method 601 compounds.

   Rationale: Based on the direction of groundwater flow, it is probable that contaminants are migrating from Area A towards base production well BW-18. Samples collected from this middle zone monitoring well in June of 1985 contained TCE and 1,1-DCE. Contaminants detected in this well will further define the areal and vertical extent of contamination. If continued sampling is justified, this well should be redeveloped and retrofitted with a dedicated system to maintain sample integrity and reduce the chance for cross-contamination between monitoring wells. The well should be redeveloped to remove formation material (if present) and to allow groundwater to flow freely into the well casing. Installation of dedicated systems would also reduce both labor and analytical costs. Less time would be required for sampling and additional QA/QC (equipment blanks) would not be necessary.

2) **Recommendation:** Collect groundwater samples from MW-26D located in Area A and analyze for the presence of U.S. EPA Method 601 compounds.

   Rationale: Samples collected from this middle zone monitoring well in June of 1985 contained TCE, 1,1-DCE, 1,1,1-TCA, and chloroform. MW-69, located approximately 500 feet to the north, has not detected any of these analytes. Therefore, MW-26D may be located on a preferential flow path for contaminant migration southwest of Area A. This well should also be redeveloped and retrofitted with a dedicated sampling system for the same reasons stated in Recommendation #1, should the analytical results indicate the need for continued sampling.

3) **Recommendation:** Collect groundwater samples from MW-64 located in Area B and analyze samples for the presence of U.S. EPA Method 601 compounds.

   Rationale: This well is located east of BW-18 and will serve the same purpose as MW-25D, except that it will assess the water quality in the deep monitoring zone in this area. It should also be redeveloped and retrofitted with a dedicated sampling system for the same reasons stated in Recommendation #1, if analytical results show the need for continued sampling.

4) **Recommendation:** Collect field duplicates from wells that have historically shown quantitative levels of contaminants over a range of concentrations. In addition, perform laboratory duplicate analyses on the same samples.

   Rationale: This is necessary so that adequate data are collected in the future for statistical analyses of total variability and so that analytical variability can be quantified as a component of total variability.

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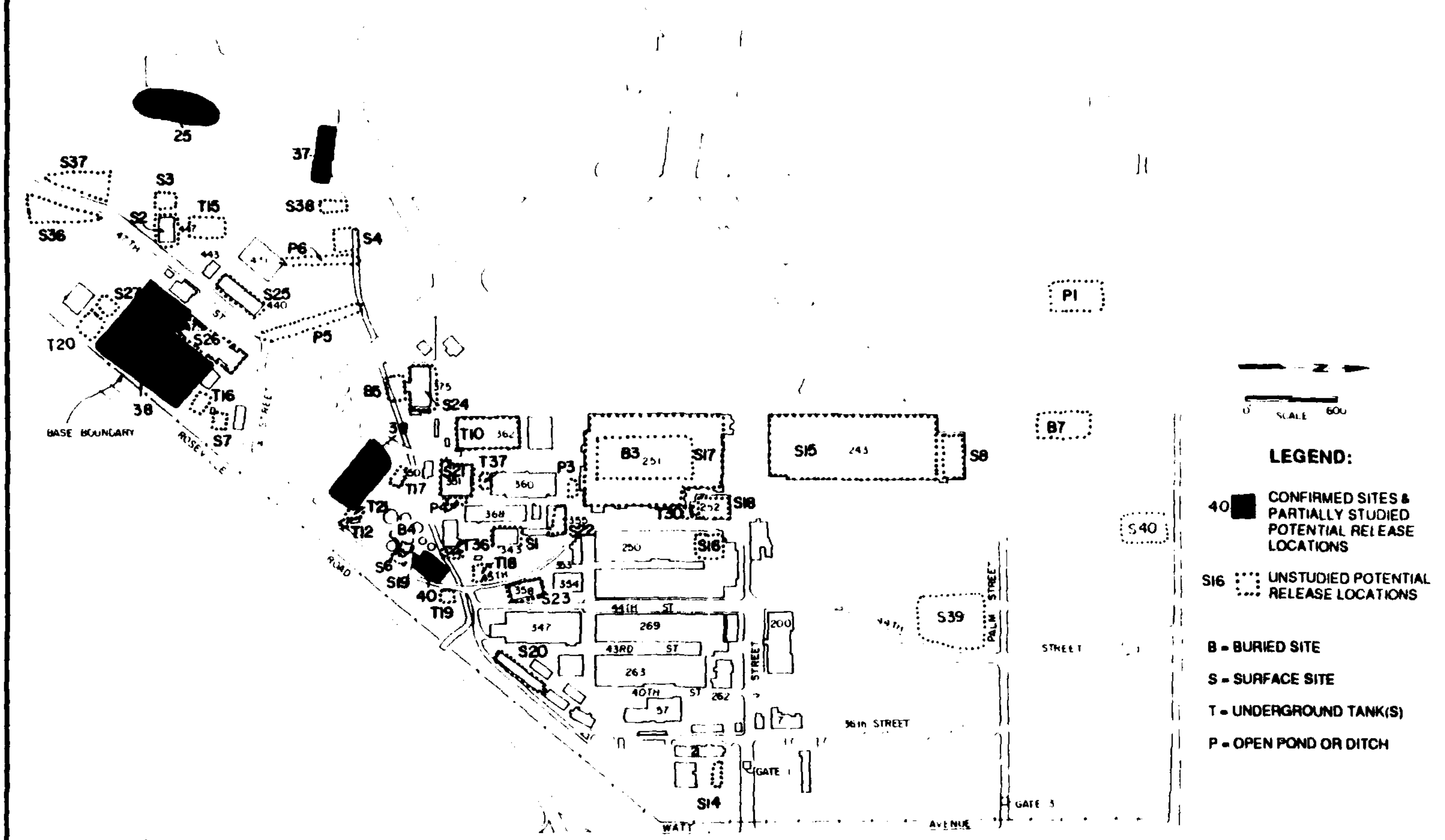
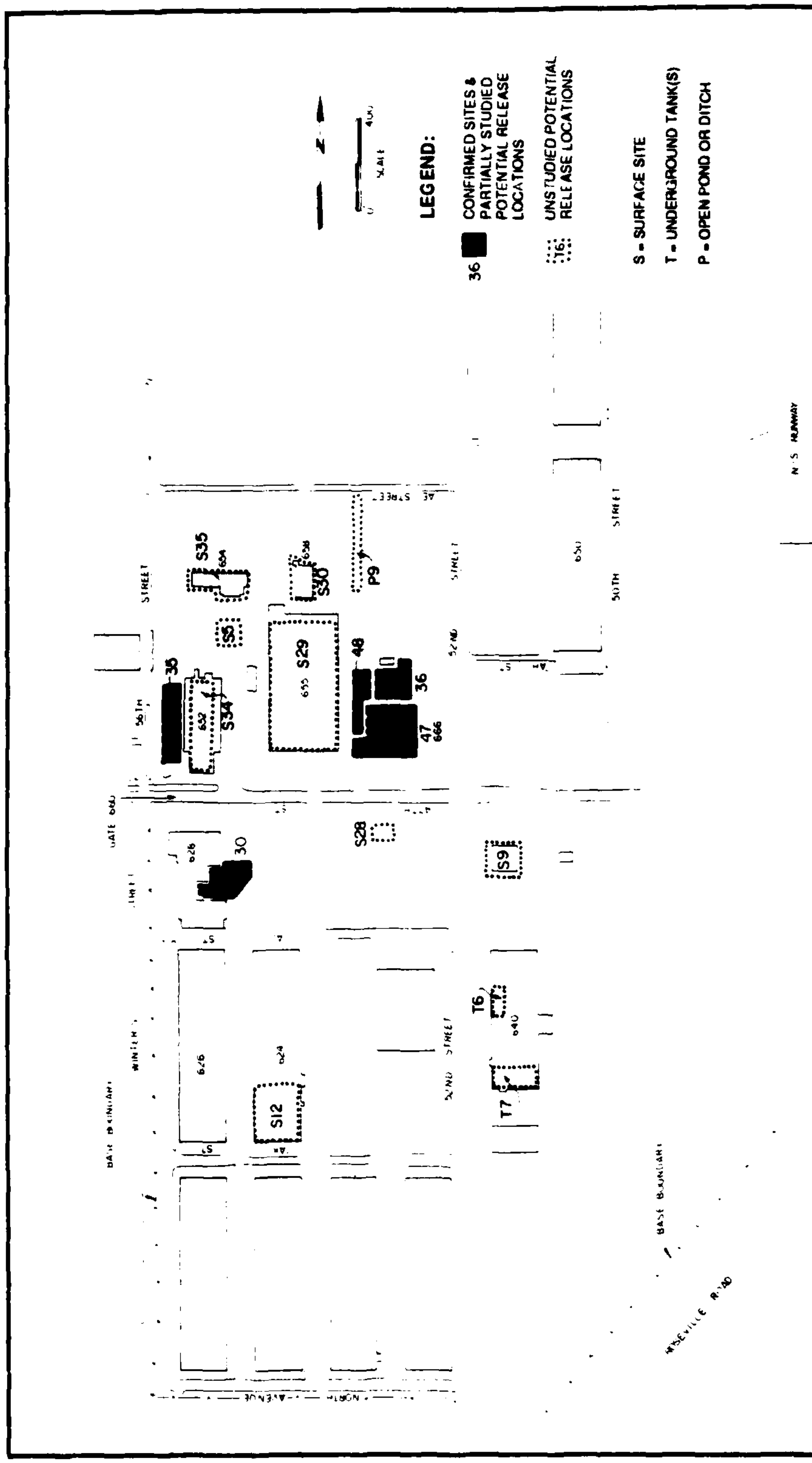
APPENDIX A

Confirmed Sites, Partially Studied Potential Release Locations, and Unstudied Potential Release Locations at McClellan AFB (Tables and Figures)



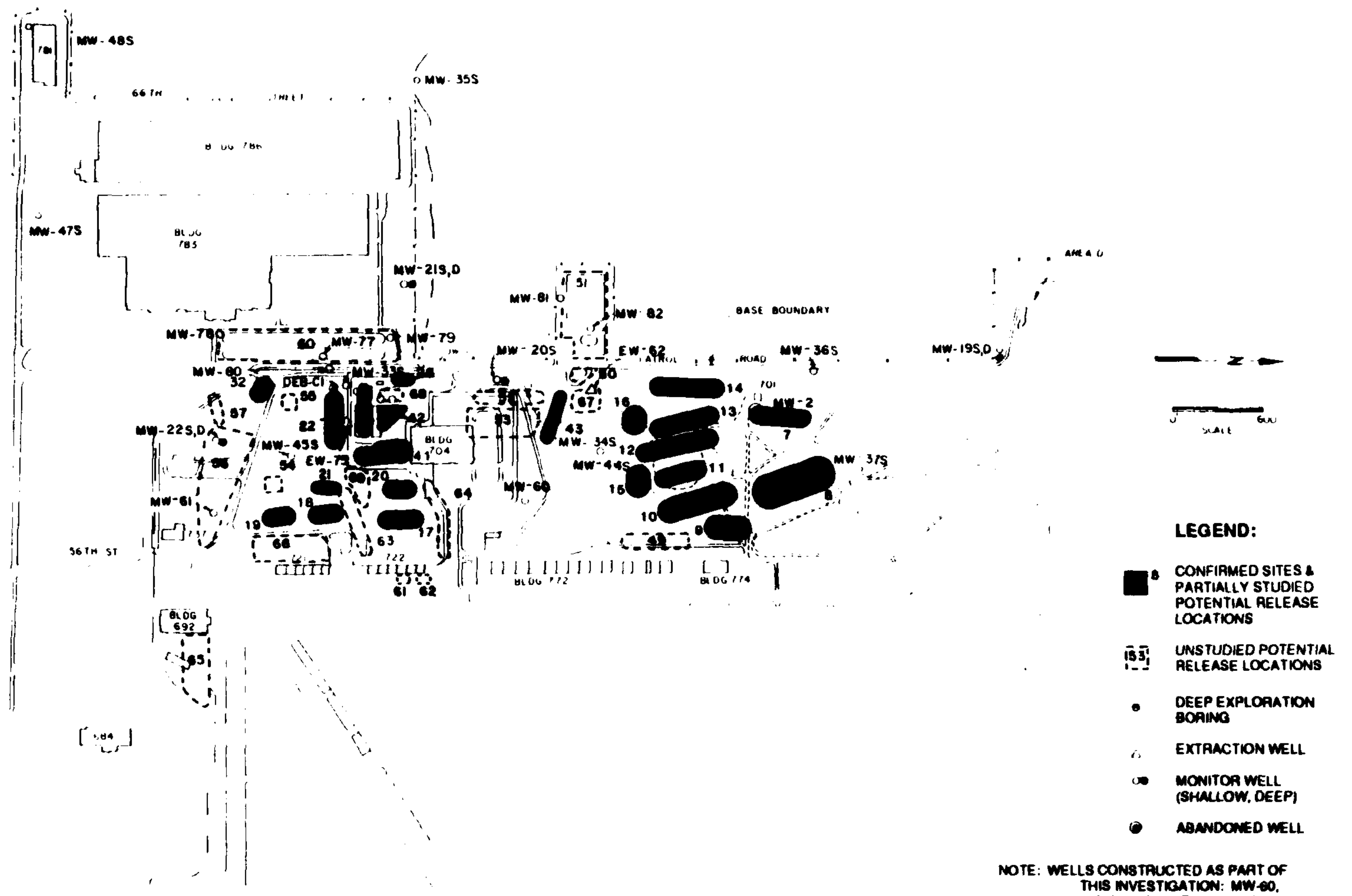
SOURCE: McLaren Environmental Engineering, December 1986.

Figure A-1. Confirmed Sites, Partially Studied Potential Release Locations, & Unstudied Potential Release Locations in Area A, McClellan AFB



SOURCE: McLaren Environmental Engineering, December 1986.

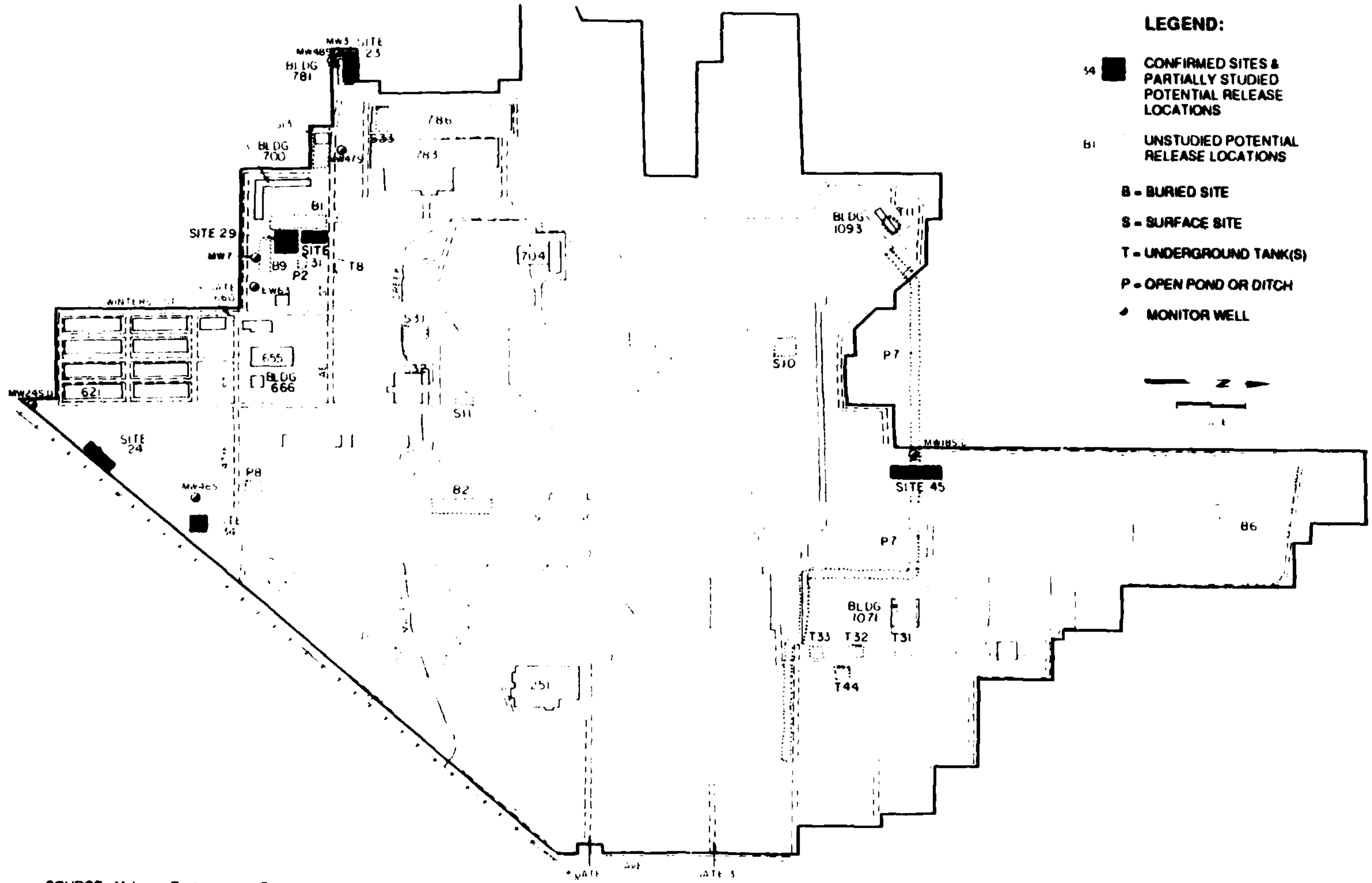
Figure A-2. Confirmed Sites, Partially Studied Potential Release Locations, & Unstudied Potential Release Locations in Area B, McClellan AFB



NOTE: WELLS CONSTRUCTED AS PART OF THIS INVESTIGATION: MW-60, MW-61, EW-62, EW-75, MW-77 THROUGH MW-82, & DEB-C1

SOURCE: McLaren Environmental Engineering, December 1986.

Figure A-3. Confirmed Sites, Partially Studied Potential Release Locations, & Unstudied Potential Release Locations in Area C, McClellan AFB



SOURCE: McLaren Environmental Engineering, December 1986.

Figure A-4. Confirmed Sites, Partially Studied Potential Release Locations, & Unstudied Potential Release Locations in Other On-Base Areas, McClellan AFB

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA A AND ADJACENT ON-BASE AREAS				
PSPRL 25	LANDFILL	40's-EARLY 50's	S END OF N/S RUNWAY	NONE DETECTED
PSPRL 37	LANDFILL	EARLY 50's	ADJ. TO TAXIWAY 7165	SOLVENTS
PSPRL 39	LANDFILL	PRE-41-46	S OF BLD 351	NONE DETECTED
PSPRL 40	INDUSTRIAL WASTEWATER SLUDGE DRYING BEDS	55-72	NE OF SANITARY WTP	SOLVENTS
SITE 38	UNDGRD TANKS/SLUDGE LANDFILL	50	BLD 475	SOLVENTS PRIORITY POLLUTANTS METALS
UPRL B-3	LANDFILL	UNKNOWN	UNDER BLD 251	SOLVENTS PETROLEUM PRODUCTS
UPRL B-4	SLUDGE DRYING BED	UNKNOWN	S OF BLD 344	SOLVENTS METALS
UPRL B-5	LANDFILL	UNKNOWN	S OF BLD 375	SOLVENTS PETROLEUM PRODUCTS
UPRL B-7	SPOIL AREA	UNKNOWN	N OF BLD 243	UNKNOWN
UPRL P-1	DRAINAGE DITCH/PONDS	UNKNOWN	W OF BLD878	SOLVENTS PETROLEUM PRODUCTS
UPRL P-2	WASTE POND	UNKNOWN	S OF BLD 687	SOLVENTS PETROLEUM PRODUCTS
UPRL P-3	OIL PIT	UNKNOWN	S OF BLD 251	SOLVENTS PETROLEUM PRODUCTS
UPRL P-4	SUMP	UNKNOWN	E OF BLD 351	SOLVENTS PETROLEUM PRODUCTS
UPRL P-5	OPEN DITCH	UNKNOWN	N OF BLD 475	SOLVENTS OTHER
UPRL P-6	OPEN DITCH	UNKNOWN	N OF BLD 475	SOLVENTS OTHER

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA A AND ADJACENT ON-BASE AREAS				
UPRL S-1	PLATING SHOP	UNKNOWN	IN BLD 343	SOLVENTS METALS CYANIDE
UPRL S-2	CHEMICAL WHAREHOUSE	UNKNOWN	IN BLD 447	SOLVENTS
UPRL S-3	ACID STORAGE WRHS	UNKNOWN	W OF BLD 447	ACIDS
UPRL S-4	TREATMENT PLANT/SLUDGE BEDS	UNKNOWN	N OF BLD 431	SOLVENTS METALS PETROLEUM PRODUCTS
UPRL S-6	IWTP #1	UNKNOWN	E OF BLD 346	SOLVENTS METALS
UPRL S-7	IWTP #3	UNKNOWN	NE OF BLD 475	SOLVENTS METALS
UPRL S-8	ELECTROPLATING SHOP	UNKNOWN	IN BLD 243G	SOLVENTS METALS CYANIDE
UPRL S-14	PAINT SHOP/SPRAY BOOTH	UNKNOWN	BLD 22	SOLVENTS PETROLEUM PRODUCTS
UPRL S-15	DEGREASER/SPRAY BOOTHS	UNKNOWN	BLD 243	SOLVENTS PETROLEUM PRODUCTS
UPRL S-16	SOLVENTS,PAINT,SPRAY BOOTHS	UNKNOWN	BLD 250	SOLVENTS PETROLEUM PRODUCTS
UPRL S-17	REPAIR SHOP/SPRAY BOOTHS	UNKNOWN	BLD 251	SOLVENTS PETROLEUM PRODUCTS
UPRL S-18	REPAIR SHOP/CLEANING SHOP	UNKNOWN	BLD 252	SOLVENTS PETROLEUM PRODUCTS
UPRL S-19	ENTOMOLOGY STORAGE AREA	UNKNOWN	NE OF SANITARY WTP	PESTICIDES
UPRL S-20	PHOTO LAB	UNKNOWN	BLD 336	SOLVENTS METALS SILVER
UPRL S-21	DEGREASER/SPRAY BOOTHS	UNKNOWN	IN BLD 351	SOLVENTS PETROLEUM PRODUCTS

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA A AND ADJACENT ON-BASE AREAS				
UPRL S-22	REPAIR SHOP/SPRAY BOOTHS	UNKNOWN	IN BLD 355	SOLVENTS PETROLEUM PRODUCTS
UPRL S-23	PLATING SHOP	UNKNOWN	IN BLD 358	SOLVENTS METALS CYANIDE
UPRL S-24	DEPAINT WASHRACK	UNKNOWN	AT BLD 375	SOLVENTS PETROLEUM PRODUCTS
UPRL S-25	TRANSFORMER SHOP	UNKNOWN	BLD 440	PCB SOLVENTS PETROLEUM PRODUCTS
UPRL S-26	MAINT. SHOP/SPRAY BOOTHS	UNKNOWN	BLD 473	SOLVENTS PETROLEUM PRODUCTS
UPRL S-27	SOLV. RECOVERY STILLS	UNKNOWN	BLD 478	SOLVENTS
UPRL S-36	OIL DRUM STORAGE	UNKNOWN	N OF BLD 410	SOLVENTS PETROLEUM PRODUCTS
UPRL S-37	OIL DRUM STORAGE	UNKNOWN	N OF BLD 410	SOLVENTS PETROLEUM PRODUCTS
UPRL S-38	DRUM STORAGE	UNKNOWN	N OF BLD 431	SOLVENTS
UPRL S-39	NEW MUSEUM SITE	UNKNOWN	DUDLY BLVD/PALM ST	SOLVENTS
UPRL T-10	SOLVENT TANK	UNKNOWN	BLD 362	SOLVENTS
UPRL T-12	WASTE OIL/SOLVENT TANK	UNKNOWN	BLD 342	SOLVENTS
UPRL T-15	TANK FARM	UNKNOWN	N OF BLD 447	SOLVENTS PETROLEUM PRODUCTS
UPRL T-16	TANK FARM	UNKNOWN	N OF BLD 475	SOLVENTS PETROLEUM PRODUCTS
UPRL T-17	TANK FARM	UNKNOWN	S OF BLD 350	SOLVENTS PETROLEUM PRODUCTS
UPRL T-18	TANK FARM	UNKNOWN	E OF BLD 343	SOLVENTS PETROLEUM PRODUCTS

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA A AND ADJACENT ON-BASE AREAS				
UPRL T-19	TANK FARM	UNKNOWN	E OF BLD 344	SOLVENTS PETROLEUM PRODUCTS
UPRL T-20	TANK FARM	UNKNOWN	SW OF BLD 475	SOLVENTS PETROLEUM PRODUCTS
UPRL T-21	UNDERGROUND SOLVENT TANK	UNKNOWN	W OF BLD 342	SOLVENTS PETROLEUM PRODUCTS
UPRL T-30	UNDERGROUND SOLVENT TANK	UNKNOWN	S OF BLD 252	SOLVENTS
UPRL T-36	500 GAL. STODDARD SOLV. TANK	UNKNOWN	NEAR BLD 329	SOLVENTS
UPRL T-37	STODDARD SOLVANT TANK	UNKNOWN	S OF BLD 360	SOLVENTS
UPRL T-47	OIL/WATER SEPERATOR	UNKNOWN	E OF BLD 346A	PETROLEUM PRODUCTS
AREA B AND ADJACENT ON-BASE AREAS				
PSPRL 30	RADIO/CHEM LAB LANDFILL	LATE 50's-EARLY 80's	E OF BLD 628	SOLVENTS METALS
PSPRL 35	SCRAP METAL BURIAL PIT	WWII	BLD 652	NONE DETECTED
PSPRL 36	OPEN STORAGE AREA	58-80	N OF BLD 666	SOLVENTS CYANIDE
SITE 47	ABANDON PLATING SHOP	UNKNOWN	BLD 666	SOLVENTS METALS
SITE 48	ABANDON IWTP	UNKNOWN	IWTP#4	SOLVENTS METALS OIL/GREASE
UPRL B-1	LANDFILL	UNKNOWN	E OF BLDG 700	UNKNOWN
UPRL P-9	OPEN DRAINAGE DITCH	UNKNOWN	N OF BLD 660	SOLVENTS METALS
UPRL S-5	IWTP	UNKNOWN	N OF BLD 652	SOLVENTS METALS
UPRL S-9	ASBESTOS STORAGE	UNKNOWN	E OF BLD 642	ASBESTOS

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA B AND ADJACENT ON-BASE AREAS				
UPRL S-12	PCB STORAGE	UNKNOWN	BLD 624	PCB
UPRL S-13	OPEN STORAGE	UNKNOWN	BLDS 709,727,729	SOLVENTS
UPRL S-28	OIL/PAINT STORAGE	UNKNOWN	N OF BLD 600	OIL/GREASE
UPRL S-29	PCB STORAGE	UNKNOWN	IN BLD 655	PCB
UPRL S-30	DEPAINT WASHRACK	UNKNOWN	BLD 658	SOLVENTS PETROLEUM PRODUCTS
UPRL S-33	HAZ. MAT. STORAGE	UNKNOWN	BLD 786	SOLVENTS OTHER
UPRL S-34	DEGREASER/PAINT SPRAY BOOTH	UNKNOWN	BLD 652	SOLVENTS OTHER
UPRL S-35	SOLV. SPRAY BOOTH	UNKNOWN	BLD 654	SOLVENTS OTHER
UPRL S-41	MAT K DRAINAGE	UNKNOWN	S OF BLD 711	SOLVENTS PETROLEUM PRODUCTS LEAD
UPRL T-6	UNDERGROUND SOLVENT TANK	UNKNOWN	BLD 640	SOLVENTS
UPRL T-7	SOLV. PIT/WASTE THINNER TANK	UNKNOWN	BLD 640	SOLVENTS
UPRL T-8	CONTAM. FUEL TANK	UNKNOWN	BLD 756	PETROLEUM PRODUCTS SOLVENTS
UPRL T-45	OIL/WATER SEPERATOR	UNKNOWN	N OF BLD 74	PETROLEUM PRODUCTS
UPRL T-46	OIL/WATER SEPERATOR	UNKNOWN	S OF BLD 764	PETROLEUM PRODUCTS
UPRL T-48	OIL/WATER SEPERATOR	UNKNOWN	S OF BLD 765	PETROLEUM PRODUCTS
AREA C AND ADJACENT ON-BASE AREAS				
SITE 7	SLUDGE/OIL PIT	62-74	E OF BLD 701	PRIORITY POLLUTANTS OIL/GREASE PCB
PSPRL 8	SLUDGE/REFUSE LANDFILL	74-81	NW OF BLD 774	SOLVENTS PRIORITY POLLUTANTS

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA C AND ADJACENT ON-BASE AREAS				
PSPRL 9	LANDFILL	PRE-49-53	W OF BLD 774	PRIORITY POLLUTANTS
SITE 10	LANDFILL	53-55	W OF BLD 774	PRIORITY POLLUTANTS PCB
SITE 11	LANDFILL	55-57	W OF BLD 774	PRIORITY POLLUTANTS
SITE 12	LANDFILL	67-69	SW OF BLD 774	PRIORITY POLLUTANTS
SITE 13	LANDFILL	69-71	W OF BLD 774	PRIORITY POLLUTANTS
SITE 14	LANDFILL	71-74	S OF BLD 701	PRIORITY POLLUTANTS
PSPRL 15	SODIUM VALVE TRENCH	40-50	SW OF BLD 774	NONE DETECTED
PSPRL 16	SODIUM VALVE TRENCH	40-50	S OF BLD 701	NONE DETECTED
PSPRL 17	LANDFILL	57-59	SE OF BLD 704	SOLVENTS
PSPRL 18	LANDFILL	57-59	SE OF BLD 704	NONE DETECTED
PSPRL 19	LANDFILL	57-59	SE OF BLD 704	NONE DETECTED
PSPRL 20	SLUDGE/OIL PIT	56-57	SE OF BLD 704	SOLVENTS
PSPRL 21	SLUDGE/OIL PIT	56-57	SE OF BLD 704	SOLVENTS
SITE 22	BURN PIT/LANDFILL	46-68	S OF IWTP AERA. BSN	PRIORITY POLLUTANTS PCB OIL/GREASE
PSPRL 28	SLUDGE PIT	PRE-72	W OF IWTP	PRIORITY POLLUTANTS
PSPRL 32	RADIO/HAZ WASTE STORAGE	PRE-63-68	S OF IWTP	PRIORITY POLLUTANTS
PSPRL 41	LANDFILL	MID-40's	BLD 704	PRIORITY POLLUTANTS METALS
SITE 42	OIL STORAGE/LANDFILL	MID-40's-60's	IWTP AERATION BASIN	PRIORITY POLLUTANTS OIL/GREASE PCB
SITE 43	LANDFILL	MID-40'S	NW OF BLD 704	PRIORITY POLLUTANTS
PSPRL 49	LANDFILL	50's	NE OF BLD 704	NONE DETECTED

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA C AND ADJACENT ON-BASE AREAS				
PSPRL 50	SETTLING POND	MID-TO-LATE 50's	NW OF BLD 704	NONE DETECTED
PSPRL 51	HOLDING POND	80 TO PRESENT	NW OF IWTP	NONE DETECTED
SITE 52	BURN DEBRIS PIT	57	NW OF BLD 704	PRIORITY POLLUTANTS
PSPRL 53	SETTLING POND	MID-TO-LATE 50's	NW OF BLD 704	SOLVENTS
PSPRL 54	STORAGE AREA	MID-60's	S OF BLD 704	NONE DETECTED
PSPRL 55	ACID STORAGE AREA/LANDFILL	MID-50's	S OF BLD 704	SOLVENTS
PSPRL 56	STORAGE AREA	50's-60's-70's	S OF BLD 704	NONE DETECTED
PSPRL 57	LANDFILL	50's-60's	S OF BLD 704	NONE DETECTED
PSPRL 60	HOLDING POND	CURRENT	S OF IWTP	NONE DETECTED
PSPRL 61	CHEMICAL WASTE PIT	54	E OF BLD 722	NONE DETECTED
PSPRL 62	CHEMICAL WASTE PIT	54	E OF BLD 722	NONE DETECTED
PSPRL 63	UNLINED DITCH	60's	SE OF BLD 704	NONE DETECTED
PSPRL 64	UNLINED DITCH	60's	SE OF BLD 704	NONE DETECTED
PSPRL 65	LANDFILL	65	E OF BLD 692	NONE DETECTED
PSPRL 66	DITCHES AND POND	MID-60's	W OF BLD 721	NONE DETECTED
SITE 67	LANDFILL	PRE-47	NW OF BLD 702	PRIORITY POLLUTANTS PETROLEUM PRODUCTS
PSPRL 68	SLUDGE PONDS	40's	W OF SITE 42	PRIORITY POLLUTANTS
SITE 69	BURN PIT	50's	SE OF BLD 704	PRIORITY POLLUTANTS
UPRL S-11	BCE/PCE STORAGE	UNKNOWN	BLD 636	PCB SOLVENTS PETROLEUM PRODUCTS
UPRL S-31	AIRCRAFT PAINT HANGAR	UNKNOWN	BLD 692	PAINTS SOLVENTS PETROLEUM PRODUCTS

IWTP = Industrial Waste Treatment Plant
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PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
AREA C AND ADJACENT ON-BASE AREAS				
UPRL S-32	PAINT STORAGE AREA	UNKNOWN	BLD 694	PAINTS SOLVENTS PETROLEUM PRODUCTS
AREA D AND ADJACENT ON-BASE AREAS				
SITE 1	LANDFILL	59-62	NW CORNER OF BASE	PRIORITY POLLUTANTS
SITE 2	SLUDGE/OIL PIT	62-79	NW CORNER OF BASE	PRIORITY POLLUTANTS
SITE 3	SLUDGE/OIL PIT	62-65	NW CORNER OF BASE	PRIORITY POLLUTANTS
SITE 4	SLUDGE/OIL PIT	67-81	NW CORNER OF BASE	PRIORITY POLLUTANTS
SITE 5	SLUDGE/OIL PIT	72-78	NW CORNER OF BASE	PRIORITY POLLUTANTS
SITE 6	OIL BURN PIT	72-78	NW CORNER OF BASE	SOLVENTS METALS
PSPRL 27	SODIUM VALVE TRENCH	LATE 40's-EARLY 50's	BLD 1085	NONE DETECTED
PSPRL 33	I W SLUDGE LANDFARM	72	NW CORNER OF BASE	SOLVENTS
SITE 26	SLUDGE/OIL BURN PIT	EARLY 60's	NW CORNER OF BASDE	SOLVENTS METALS
SITE A	SLUDGE DISPOSAL PIT	60's	NW CORNER OF BASE	SOLVENTS PRIORITY POLLUTANTS METALS
SITE S	FUEL/SOLVENT/OILBURN PIT	62-68	NW CORNER OF BASE	SOLVENTS PRIORITY POLLUTANTS PETROLEUM PRODUCTS
SITE T	FUEL/SOLVENT SLUDGE PIT	64-66	NW CORNER OF BASE	SOLVENTS PRIORITY POLLUTANTS METALS PETROLEUM PRODUCTS
UPRL T-11	UNDERGROUND STORAGE TANK	UNKNOWN	BLD 1093	SOLVENTS

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

SITE/LOCATION SPECIFIC DATA, McCLELLAN AFB, CALIFORNIA

Site/ Location ID	Description	Years of Operation	Location	Contaminant Types
OTHER ON-BASE AREAS				
PSPRL 29	LANDFILL	50's-60's	NE OF BLD 700	NONE DETECTED
PSPRL 31	INCINERATOR ASH BURIAL PIT	63-68	NEAR BLD 680	ARSENIC
PSPRL 34	WASTE SOLVENT STORAGE TANKS	50-53	ADJ. TO TAXIWAY 7165	SOLVENTS OIL/GREASE
SITE 23	LANDFILL	66-69	BLD 781	PRIORITY POLLUTANTS
SITE 24	LANDFILL	66-69	E OF BLD 621	PRIORITY POLLUTANTS
UPRL B-6	WASTE AREA	UNKNOWN	N OF N/S RUNWAY	UNKNOWN
UPRL P-7	OPEN DITCH	UNKNOWN	NE,TO AREA D	PETROLEUM PRODUCTS
UPRL P-8	ACID AND CYANIDE PIT	UNKNOWN	S END OF N/S RUNWAY	ACID METALS
UPRL S-10	STORAGE AREA	UNKNOWN	NW OF BLD 1086	SOLVENTS RADIATION
UPRL S-40	TROOP ISSUE SITE	UNKNOWN	NW OF BLD 910	UNKNOWN
UPRL S-42	HOBBY SHOP/M&R WASHRACK	UNKNOWN	N OF BLD 1439	SOLVENTS PETROLEUM PRODUCTS
UPRL S-43	AIRCRAFT WASHRACK	UNKNOWN	NE CORNER OF MAT V	SOLVENTS PETROLEUM PRODUCTS
UPRL S-44	AIRCRAFT MAINT. AREA	UNKNOWN	S OF BLD 1071/MAT U	SOLVENTS PETROLEUM PRODUCTS
UPRL S-45	AIRCRAFT MAINT. AREA	UNKNOWN	W OF BLD 878	SOLVENTS PETROLEUM PRODUCTS
UPRL T-31	UNDERGROUND STORAGE TANK	UNKNOWN	NEAR BLD 1028	SOLVENTS
UPRL T-32	UNDERGROUND STORAGE TANK	UNKNOWN	NEAR BLD 1023	SOLVENTS
UPRL T-33	UNDERGROUND STORAGE TANK	UNKNOWN	NEAR BLD 1021	SOLVENTS
UPRL T-44	STODDARD SOLVENT TANK	UNKNOWN	NW OF BLD 1048	SOLVENTS

IWTP = Industrial Waste Treatment Plant
UPRL = Unstudied Potential Release Location
PSPRL = Partially Studied Potential Release Location

RADIAN CORPORATION

APPENDIX B

Summary of Analytical Data for Wells Containing Nine Commonly Detected Halocarbons

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-6	MW-6	MW-6	MW-6	MW-7	MW-7	MW-7	MW-7	MW-8	MW-8	MW-9
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW
Date Sampled			12/ /81	03/ /82	10/ /84	06/13/85	12/ /81	03/ /82	09/ /84	05/31/85	12/ /81	03/ /82	12/ /81
Sampled By						RADIAN				RADIAN			
Date Analyzed						06/18/85				06/04/85			
Lab						RAS				RAS			
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	8.2	5.6	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	8.4	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	118	24	27	86.2	14.4	30	20	38.2	296	61	4.03
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-9	MW-9	MW-9	MW-9	MW-10	MW-10	MW-10	MW-10	MW-11	MW-11	MW-11
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			03/ /82	04/ /82	09/ /84	06/16/85	12/ /81	03/ /82	06/20/85	10/26/87	12/ /81	03/ /82	08/ /82
Sampled By						RADIAN			RADIAN	RADIAN			
Date Analyzed						06/19/85			06/24/85				
Lab						RAS			RAS	SAC			
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	810	ND	20	ND
1,1-Dichloroethene	6	7	ND	ND	ND	0.4	ND	500	1500	1100	ND	19300	63000
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	19	118	330	ND	170	250
Chloroform	100	100	ND	20	11.5	40.0	ND	ND	ND	ND	ND	40	ND
1,2-Dichloroethane	1	5	ND	ND	ND	0.2	ND	17	94.7	330	ND	4300	12000
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	327	21	ND	ND	ND
Carbon tetrachloride	5	5	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	225	ND	134	>313	140	826	910	10.4	2100	5000
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	64.9	ND	ND	10	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-11	MW-11	MW-12	MW-12	MW-12	MW-12	MW-12	MW-14	MW-14	MW-14	MW-14
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			06/20/85	10/27/87	12/ /81	04/ /82	08/ /82	06/19/85	10/23/87	12/ /81	03/ /82	08/ /82	06/19/85
Sampled By			RADIAN	RADIAN				RADIAN	RADIAN				RADIAN
Date Analyzed			06/24/85					06/21/85					06/21/85
Lab			RAS	SAC				RAS	SAC				RAS
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	25	ND	ND
1,1-Dichloroethene	6	7	64300	46000	ND	4200	2500	25500	11000	ND	4600	17000	22600
1,1-Dichloroethane	20	NE	3560	ND	ND	ND	ND	ND	ND	ND	110	100	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	120	ND	2320
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2790
1,1,1-Trichloroethane	200	200	18100	10000	ND	ND	2700	12400	3200	ND	8700	3400	22800
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	11900	8000	3730	930	160	12100	4700	14100	5800	11000	26600
Tetrachloroethene	4	NE	2480	ND	ND	70	18	1260	280	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-14	MW-15	MW-15	MW-15	MW-15	MW-15	MW-16D	MW-16S	MW-17D	MW-17D	MW-17D
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE
Date Sampled			10/26/87	12/ /81	04/ /82	08/ /82	06/16/85	10/26/87	06/14/85	05/30/85	05/30/85	05/30/85	05/14/87
Sampled By							RADIAN		RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed							06/19/85		06/19/85	05/31/85	05/31/85	05/31/85	05/18/87
Lab			SAC				RAS	SAC	RAS	RAS	RAS	RAS	SAC
Field Analysis											FDA	FDB	
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	260	ND	5980	9600	16500	1500	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	225	200	1780	15	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	20	40	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	350	ND	2200	2500	4100	180	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	350	1.79	2800	3000	18000	1000	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-17D	MW-17D	MW-17D	MW-17S	MW-17S	MW-18D	MW-18D	MW-18D	MW-18D	MW-18D	MW-18D
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			08/11/87	10/22/87	01/27/88	06/05/85	06/05/85	06/14/85	03/28/86	10/01/86	01/12/87	04/29/87	08/11/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/17/87	10/27/87	01/29/88	06/07/85	06/07/85	06/19/85	04/01/86	10/02/86	01/19/87	05/01/87	08/17/87
Lab			SAC	SAC	SAC	RAS	RAS	RAS	SAC	SAC	SAC	SAC	SAC
Field Analysis						FDA	FDB						
Lab Analysis													LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	0.32C	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	0.13	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	0.4	0.25	ND	ND	[illegible]
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	0.39C	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-18D	MW-18D	MW-18D	MW-18S	MW-19D	MW-19D	MW-19D	MW-19S	MW-19S	MW-19S	MW-20D
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	SHALLOW	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	MIDDLE
Date Sampled			08/11/87	10/08/87	01/22/88	06/06/85	04/ /82	08/ /82	06/16/85	06/14/85	03/13/86	10/16/86	06/ /82
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN			RADIAN	RADIAN	RADIAN	RADIAN	
Date Analyzed			08/17/87	10/13/87	01/25/88	06/07/85			06/19/85	06/19/85	03/19/86	10/20/86	
Lab			SAC	SAC	SAC	RAS			RAS	RAS	SAC	SAC	
Field Analysis													
Lab Analysis			LDB										
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	0.9	0.8	1.2C	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19C	ND
Chloroform	100	100	ND	ND	0.10C	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	1.1	ND	ND	ND	4.3	2.6	8.2C	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D	MW-20D
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			08/ /82	09/ /84	06/18/85	05/06/86	05/06/86	10/27/86	01/29/87	05/05/87	07/28/87	10/12/87	01/22/88
Sampled By					RADIAN	USAF	USAF	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed					06/21/85	05/16/86	05/16/86	10/28/86	01/30/87	05/06/87	07/29/87	10/13/87	01/26/88
Lab					RAS	ANLAB	ANLAB	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis						LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
USAF = United States Air Force
RAS = Radian Analytical Services
ANLAB = Anlab Analytical Lab
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-20S	MW-20S	MW-20S	MW-20S	WELL NUMBER MW-20S	MW-20S	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			05/ /82	08/ /82	09/ /84	06/03/85	05/06/86	10/27/86	06/ /82	08/ /82	09/ /84	06/03/85	03/19/86
Sampled By						RADIAN	USAF	RADIAN				RADIAN	RADIAN
Date Analyzed						06/04/85	05/16/86	10/28/86				06/04/85	03/20/86
Lab						RAS	ANLAB	SAC				RAS	SAC
Field Analysis													
Lab Analysis													LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	0.3	ND	4.7	0.35C	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	3.5	ND	ND	3.4C	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	1.2	3.2	ND	0.91C	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	2.3	3.0	ND	ND	ND	ND	0.8	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	0.40C	ND	ND	ND	ND	ND

ALL UNITS ARE ug/1
MW = Monitoring Well
LDA = First laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
USAF = United States Air Force
RAS = Radian Analytical Services
ANLAB = Anlab Analytical Lab
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21D	MW-21S	MW-21S	MW-21S
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW
Date Sampled			03/19/86	09/30/86	01/21/87	05/01/87	08/14/87	08/14/87	10/17/87	01/25/88	06/ /82	08/ /82	09/ /84
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN			
Date Analyzed			03/26/86	10/01/86	01/26/87	05/05/87	08/19/87	08/19/87	10/20/87	01/27/88			
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC			
Field Analysis													
Lab Analysis			LDB				LDA	LDB					
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

WELL NUMBER (spans MW-21D through MW-21S columns)

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-21S	MW-22D
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	DEEP
Date Sampled			06/20/85	03/15/86	09/30/86	01/30/87	05/01/87	08/14/87	10/17/87	01/25/88	01/25/88	01/25/88	04/ /82
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	
Date Analyzed			06/24/85	03/21/86	10/01/86	02/04/87	05/05/87	08/19/87	10/20/87	01/27/88	01/27/88		
Lab			RAS	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	CES	
Field Analysis													
Lab Analysis										LDA	LDB		
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	0.1	0.19	ND	ND	ND	0.13C	0.16PC	0.13PC	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	2.1	0.2	0.99	ND	ND	1.9C	0.40C	0.48PC	0.44PC	0.6	ND
Tetrachloroethane	4	NE	ND	ND	0.12	ND	ND	ND	ND	ND	ND	ND	ND

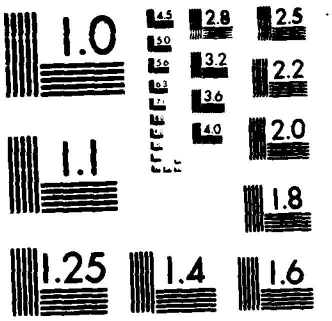
ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

AD-A198 861 INSTALLATION RESTORATION PROGRAM STAGE 3 MCCLELLAN AIR FORCE BASE(U) RADIAN CORP SACRAMENTO CA SEP 88 F33615-87-D 4023 3/4

UNCLASSIFIED F/G 24/4 NL



MICROCOPY

SUMMARY OF COMMONLY DETECTED ANAL TES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D	MW-22D
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			08/ /82	09/ /84	09/ /84	06/20/85	05/06/86	10/29/86	01/23/87	05/06/87	08/06/87	10/14/87	10/14/87
Sampled By						RADIAN	USAF	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed						06/24/85	05/16/86	10/30/86	01/29/87	05/11/87	08/10/87	10/16/87	11/09/87
Lab						RAS	ANLAB	SAC	SAC	SAC	SAC	SAC	CES
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6	7	ND	ND	ND	297	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	16.7	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	1.2	1.8	133	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	1.4	2.4	213	15	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	13.5	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
USAF = United States Air Force
RAS = Radian Analytical Services
ANLAB = Anlab Analytical Lab
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-22D	MW-22S	MW-22S	MW-22S	WELL NUMBER MW-22S	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D
Monitoring Zone			DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			01/19/88	06/ /82	08/ /82	09/ /84	05/06/86	04/ /82	08/ /82	09/ /84	06/10/85	03/17/86	03/17/86
Sampled By			RADIAN				USAF				RADIAN	RADIAN	RADIAN
Date Analyzed			01/20/88				05/16/86				06/12/85	03/20/86	03/20/86
Lab			SAC				ANLAB				RAS	SAC	SAC
Field Analysis												FDA	FDB
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	8	16	47.3	68	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
USAF = United States Air Force
RAS = Radian Analytical Services
ANLAB = Anlab Analytical Lab
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S. EPA Primary MCL	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23D	MW-23S	MW-23S	MW-23S	MW-24D
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	MIDDLE
Date Sampled			10/16/86	01/22/87	05/05/87	08/12/87	08/12/87	10/25/87	01/21/88	04/ /82	08/ /82	06/03/85	04/ /82
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN			RADIAN	
Date Analyzed			10/20/86	01/28/87	05/06/87	08/18/87	08/18/87	10/29/87	01/22/88			06/04/85	
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC			RAS	
Field Analysis													
Lab Analysis						LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.5	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	0.4B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.7	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l

MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
B = Compound detected in laboratory blank - not edited
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-24D	MW-24D	MW-24D	MW-24D	MW-24D	MW-24D	MW-24D	MW-24D	MW-24D	MW-24D	MW-24S
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW
Date Sampled			08/ /82	06/07/85	03/20/86	09/26/86	09/26/86	01/22/87	05/05/87	08/13/87	10/25/87	01/19/88	04/ /82
Sampled By				RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	
Date Analyzed				06/12/85	03/26/86	09/29/86	09/29/86	01/27/87	05/06/87	08/17/87	10/29/87	01/20/88	
Lab				RAS	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	
Field Analysis													
Lab Analysis						LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First Laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-24S	MW-24S	MW-25D	MW-25D	MW-25D	MW-25D	MW-25S	MW-25S	MW-25S	MW-25S	MW-26D
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE
Date Sampled			08/ /82	06/02/85	06/ /82	08/ /82	09/ /84	06/13/85	06/ /82	08/ /82	09/ /84	05/30/85	04/ /82
Sampled By				RADIAN				RADIAN				RADIAN	
Date Analyzed				06/04/85				06/18/85				05/31/85	
Lab				RAS				RAS				RAS	
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	2.6	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	2.9	50	ND	ND	2.4	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services

ND = Nothing detected
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-26D	MW-26D	MW-26D	MW-26S	MW-26S	MW-26S	MW-26S	MW-27D	MW-27D	MW-27D	MW-27D
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			08/ /82	09/ /84	06/18/85	06/ /82	08/ /82	09/ /84	06/02/85	04/ /82	08/ /82	10/ /84	05/30/85
Sampled By					RADIAN				RADIAN				RADIAN
Date Analyzed					06/21/85				06/04/85				05/31/85
Lab					RAS				RAS				RAS
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	3.8	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	2.5	ND	ND	1.1	3.7	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	2.6	ND	ND	ND	6.5	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	8.7	ND	ND	14	21.3	ND	ND	0.7	4.6
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-27D	MW-27D	MW-27D	MW-27D	MW-27D	MW-27D	MW-27D	MW-27S	MW-27S	MW-27S	MW-27S
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			05/13/87	08/11/87	08/11/87	10/22/87	10/22/87	01/26/88	01/26/88	04/ /82	06/ /82	08/ /82	09/ /84
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN				
Date Analyzed			05/19/87	08/17/87	08/17/87	10/28/87	10/28/87	01/28/88					
Lab			SAC	SAC	SAC	SAC	SAC	SAC	CES				
Field Analysis				FDA	FDB	FDA	FDB						
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	15C	8.9C	8.0C	8.3C	8.8C	8.2C	9.5	ND	ND	ND	6.9
1,2-Dichloroethane	1	5	ND	ND	ND	0.69C	0.74C	0.41C	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	27C	13C	14C	9.1C	9.6C	5.1C	5.9	ND	ND	ND	ND
Trichloroethene	5	5	195C	76C	71C	39C	40C	35C	53.	ND	ND	15	81.2
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-27S	MW-28D	MW-28D	MW-28D	MW-28D	MW-28D	MW-28D	MW-28D	MW-28D	MW-28S	MW-29D
Monitoring Zone			SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	MIDDLE
Date Sampled			06/05/85	06/ /82	08/ /82	09/ /84	06/16/85	05/15/87	08/07/87	10/23/87	01/27/88	06/ /82	06/17/85
Sampled By			RADIAN				RADIAN	RADIAN	RADIAN	RADIAN	RADIAN		RADIAN
Date Analyzed			06/10/85				06/20/85	05/19/87	08/13/87	10/29/87	01/29/88		06/20/85
Lab			RAS				RAS	SAC	SAC	SAC	SAC		RAS
Field Analysis													FDA
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	6.5	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	18.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	2.5	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	63.4	ND	10	ND	8.9	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-29D	MW-29D	MW-29D	MW-29D	MW-29D	MW-29D	MW-29D	MW-29D	MW-29D	MW-29D	MW-29D
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			06/17/85	04/03/86	04/03/86	10/01/86	01/15/87	04/29/87	04/29/87	08/12/87	10/24/87	01/19/88	01/19/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			06/19/85	04/25/86	04/08/86	10/02/86	01/21/87	05/01/87	05/01/87	08/18/87	10/29/87	01/20/88	
Lab			RAS	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	CES
Field Analysis			FDB	FDA	FDB								
Lab Analysis								LDA	LDB				
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l

MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
RAS = Radian Analytical Services
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

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NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-30S	MW-31S	MW-31S	MW-31S	MW-31S	MW-31S	MW-31S	MW-31S	MW-31S	MW-31S	MW-31S
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			06/13/85	06/11/85	03/28/86	10/08/86	10/08/86	01/22/87	04/29/87	08/12/87	10/27/87	01/27/88	01/27/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			06/18/85	06/18/85	04/01/86	10/10/86	10/10/86	01/28/87	05/01/87	08/18/87	10/30/87	01/29/88	01/29/88
Lab			RAS	RAS	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis						LDA	LDB					LDA	LDB
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	0.1	ND	0.12	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	[illegible]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

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RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-33S	MW-33S	MW-33S	MW-33S	MW-33S	MW-33S	MW-33S	MW-33S	MW-33S	MW-33S	MW-33S
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			09/ /8	09/ /84	06/07/85	06/07/85	05/06/86	10/30/86	01/29/87	01/29/87	04/16/87	04/16/87	07/31/87
Sampled By					RADIAN	RADIAN	USAF	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed					06/12/85	06/12/85	05/16/86	11/03/86	02/03/87	01/30/87	04/17/87	04/17/87	08/05/87
Lab					RAS	RAS	ANLAB	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis					FDA	FDB			FDA	FDB	FDA	FDB	FDA
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	2.3r	1uC	15DL	10DL	11DL	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	2.6NC	4.1C	4.6DL	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	2.7NC	4.8C	5.9DL	8.1DL	8.1DL	ND
Chloroform	100	100	5	ND	ND	ND	45	42C	45C	45C	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	52	62C	88C	79C	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	0.27DL	0.49DL	0.27DL	280C
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	0.41DL	0.31DL	ND
Trichloroethene	5	5	2000	17500	22600	21500	29000	25000C	22000C	27000C	25000C	24000C	45000C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	9.8DL	8.7DL	8.5DL	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

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USAF = United States Air Force
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ANLAB = Anlab Analytical Lab
SAC = Radian Analytical Services, Sacramento

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DL = Diluted out of the confirmation run
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SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-33S	MW-33S	MW-33S	MW-33S	MW-36S	MW-36S	MW-36S	MW-36S	MW-36S	MW-36S	MW-36S
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			07/31/87	09/17/87	10/26/87	01/08/88	09/ /82	09/ /84	06/06/85	03/31/86	09/17/86	01/14/87	04/16/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/05/87	09/21/87	10/29/87	01/11/88			06/07/85	04/03/86	09/23/86	01/20/87	04/17/87
Lab			SAC	SAC	SAC	SAC			RAS	SAC	SAC	SAC	SAC
Field Analysis			FDB										FDA
Lab Analysis													
Vinyl chloride	2	1	ND	5.1DL	ND	ND	ND	ND	ND	ND	0.6NC	ND	ND
1,1-Dichloroethene	6	7	ND	3.5DL	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	3.1DL	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	42DL	ND	ND	ND	ND	ND	ND	ND	ND	0.42C
1,2-Dichloroethane	1	5	ND	140DL	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	45DL	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	22DL	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	52000C	20000C	35000C	22000PC	ND	ND	2.9	1.8	2.2NC	ND	3.7C
Tetrachloroethene	4	NE	ND	6.9DL	ND	ND	5	ND	ND	ND	0.15NC	ND	0.30C

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RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-36S	MW-36S	MW-36S	MW-36S	MW-38D	MW-39S	MW-40S	MW-40S	MW-40S	MW-41S	MW-41S
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			04/16/87	07/30/87	10/21/87	01/13/88	06/19/85	09/ /82	09/ /82	09/ /84	06/02/85	09/ /82	06/10/85
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN				RADIAN		RADIAN
Date Analyzed			04/17/87	08/03/87	10/23/87	01/14/88	06/21/85				06/04/85		06/12/85
Lab			SAC	SAC	SAC	SAC	RAS				RAS		RAS
Field Analysis			FDB										
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	2230	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	0.24C	11500	ND	ND	ND	ND	5	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	4430	ND	ND	ND	ND	ND	ND
Chloroform	100	100	0.39C	ND	0.20C	ND	ND	ND	ND	10	13.5	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	300	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	1870	ND	ND	ND	ND	ND	2.3
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	3.4C	5.3C	1.8C	1.9C	296	ND	5	64.8	190	20	23.2
Tetrachloroethene	4	NE	ND	ND	0.35C	ND	260	ND	ND	ND	ND	ND	3.3

ALL UNITS ARE ug/l
MW = Monitoring Well
FDB = Second field duplicate analysis

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SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-41S	MW-41S	MW-41S	MW-41S	MW-41S	MW-41S	MW-41S	MW-41S	MW-41S	MW-41S	MW-41S
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			03/13/86	11/18/86	11/18/86	01/15/87	01/15/87	04/24/87	04/24/87	08/05/87	10/20/87	10/20/87	10/20/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			03/19/86	11/21/86	11/21/86	01/22/87	01/22/87	04/28/87	04/28/87	08/07/87	10/22/87	10/27/87	11/24/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	CES
Field Analysis				FDA	FDB	FDA	FDB				FDB	FDA	FDA
Lab Analysis								LDA	LDB				
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	1.4	1.1DL	ND	1.0C	1.0C	1.8DL	1.4DL	1.0C	1.4C	1.0C	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	0.99DL	0.28DL	ND	ND	2.1C	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	0.25DL	ND	ND	0.71DL	0.55DL	ND	ND	ND	ND
Trichloroethene	5	5	20	44C	43C	37C	37C	91C	80C	130C	100C	81C	110
Tetrachloroethene	4	NE	0.6	0.18DL	ND	ND	ND	0.75DL	0.74DL	ND	ND	3.2C	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

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ND = Nothing detected
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RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-41S	MW-41S	MW-42S	MW-42S	MW-42S	MW-43S	MW-43S	MW-44S	MW-44S	MW-44S	MW-44S
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/26/88	01/26/88	09/ /82	06/02/85	06/02/85	09/ /82	05/31/85	09/ /82	09/ /84	03/21/86	09/17/86
Sampled By			RADIAN	RADIAN		RADIAN	RADIAN		RADIAN			RADIAN	RADIAN
Date Analyzed			01/28/88			06/04/85	06/10/85		06/04/85			04/01/86	09/23/86
Lab			SAC	CES		RAS	RAS		RAS			SAC	SAC
Field Analysis						FDA	FDB						
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6	7	ND	ND	ND	ND	ND	ND	ND	30	ND	ND	0.55C
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	0.92PC	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	140PC	190.	ND	0.7	ND	ND	ND	1.0	1.2	ND	ND
Tetrachloroethene	4	NE	6.2PC	4.9	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

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SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-44S	MW-44S	MW-44S	MW-44S	MW-44S	MW-44S	MW-45S	MW-45S	MW-46S	MW-46S	MW-47S
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/12/87	05/06/87	08/13/87	10/23/87	10/23/87	01/22/88	06/04/85	05/06/86	09/ /82	06/03/85	09/ /82
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	USAF		RADIAN	
Date Analyzed			02/05/87	05/11/87	08/18/87	10/29/87	10/29/87	01/26/88	06/05/85	05/16/86		06/04/85	
Lab			SAC	SAC	SAC	SAC	SAC	SAC	RAS	ANLAB		RAS	
Field Analysis													
Lab Analysis						LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	8.5C	3.3C	3.3C	3.3C	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	0.40C	0.44C	0.63C	4.1	14	ND	2.7	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
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SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-47S	MW-49S	MW-51	MW-51	MW-51	MW-51	MW-51	MW-51	MW-51	MW-51	MW-52
Monitoring Zone			SHALLOW	SHALLOW	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	MIDDLE
Date Sampled			06/04/85	09/ /82	02/ /84	11/22/86	01/14/87	04/23/87	08/03/87	10/15/87	01/11/88	01/11/88	04/ /84
Sampled By			RADIAN			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	
Date Analyzed			06/05/85			11/25/86	01/19/87	04/27/87	08/06/87	10/19/87	01/12/88	01/12/88	
Lab			RAS			SAC	SAC	SAC	SAC	SAC	SAC	SAC	
Field Analysis											FDA	FDB	
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	18	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	0.9	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
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FDA = First field duplicate analysis
FDB = Second field duplicate analysis

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ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-52	MW-52	MW-52	MW-52	MW-52	MW-52	MW-53	MW-53	MW-53	MW-53	MW-53
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			11/24/86	01/29/87	05/11/87	07/27/87	10/16/87	01/07/88	04/ /84	11/21/86	01/20/87	05/08/87	07/28/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN		RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			12/01/86	01/29/87	05/13/87	07/28/87	10/19/87	01/08/88		11/25/86	01/23/87	05/12/87	07/29/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC		SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	6.8	ND	ND	ND	2.1C
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	3.0	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	2.1C	ND	ND	ND	ND	0.8	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-53	MW-53	MW-53	MW-54	MW-54	MW-54	MW-54	MW-54	MW-54	MW-54	MW-54
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			10/21/87	01/06/88	01/06/88	04/ /84	11/20/86	01/15/87	04/27/87	04/27/87	04/27/87	08/10/87	08/10/87
Sampled By			RADIAN	RADIAN	RADIAN		RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/23/87	01/07/88	01/08/88		12/03/86	01/22/87	05/06/87	05/06/87	05/06/87	08/14/87	08/17/87
Lab			SAC	SAC	SAC		SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis									FDA	FDA	FDB	FDA	FDB
Lab Analysis				LDA	LDB				LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	1200C	1224C	180C	160C	190C	14C	17C
1,1-Dichloroethene	6	7	13C	8.7PC	11PC	790	430C	171C	52C	51C	52C	8.9C	11C
1,1-Dichloroethane	20	NE	ND	ND	ND	25	1400C	549C	150C	140C	150C	16C	20C
Chloroform	100	100	ND	ND	ND	ND	1.8DL	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	39DL	14C	ND	ND	ND	0.23C	ND
1,1,1-Trichloroethane	200	200	2.9C	1.3PC	1.5PC	4.5	19DL	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	3.4C	2.3PC	2.7PC	4.7	9.0DL	3.9C	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	0.27C	0.16PC	0.18PC	ND	4.1DL	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-54	MW-54	MW-54	MW-54	MW-55	MW-55	MW-55	MW-55	MW-55	MW-55	MW-55
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			10/19/87	10/19/87	01/06/88	01/06/88	04/ /84	11/22/86	01/05/87	04/20/87	04/20/87	04/20/87	08/13/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN		RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/23/87	10/23/87	01/07/88	01/07/88		12/03/86	01/08/87	04/23/87	04/23/87	04/23/87	08/18/87
Lab			SAC	SAC	SAC	SAC		SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDA	FDB	FDA	FDB				FDA	FDB	FDB	
Lab Analysis											LDA	LDB	
Vinyl chloride	2	1	40C	39C	5.0C	3.6PC	ND	0.34DL	0.34DL	ND	ND	ND	ND
1,1-Dichloroethene	6	7	23C	19C	8.2C	8.5PC	900	210C	160C	110C	310C	290C	130C
1,1-Dichloroethane	20	NE	10C	8.7C	2.9C	2.6PC	24	14C	18C	16C	13C	15C	13C
Chloroform	100	100	ND	ND	ND	ND	ND	ND	0.57DL	ND	ND	ND	ND
1,2-Dichloroethane	1	5	1.2C	1.0C	0.17C	0.16PC	ND	2.9DL	2.9	0.93DL	0.70DL	0.79C	ND
1,1,1-Trichloroethane	200	200	0.58C	0.30C	ND	ND	640	15C	41C	69C	58C	55C	71C
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	1.7C	1.8C	1.4C	1.4PC	100	110C	70C	33C	29C	51C	37C
Tetrachloroethene	4	NE	ND	ND	ND	ND	26	13C	46C	47C	38C	35C	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-55	MW-55	MW-55	MW-57	MW-57	MW-57	MW-57	MW-57	MW-57	MW-57	MW-57
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			10/14/87	10/14/87	01/11/88	04/ /84	11/19/86	01/13/87	04/28/87	04/28/87	07/30/87	10/12/87	01/08/88
Sampled By			RADIAN	RADIAN	RADIAN		RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/18/87	11/09/87	01/12/88		11/22/86	01/20/87	04/30/87	04/30/87	08/03/87	10/14/87	01/11/88
Lab			SAC	CES	SAC		SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis									FDA	FDB			
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	24C	18.0	33C	22	2.3C	13C	ND	ND	1.6C	1.2C	3.6C
1,1-Dichloroethane	20	NE	4.0C	6.6	3.7C	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	0.95C	ND	1.1C	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	34C	17.0	10C	ND	ND	0.88C	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	7.0C	6.9	11C	0.9	2.5C	14C	ND	ND	ND	0.58C	2.3C
Tetrachloroethene	4	NE	25C	7.9	6.8C	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-58	MW-58	MW-58	MW-58	MW-58	MW-58	MW-58	MW-58	MW-59	MW-59	MW-59
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			11/21/86	01/19/87	01/19/87	01/19/87	04/30/87	08/06/87	10/13/87	01/11/88	04/02/86	11/18/86	01/12/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/25/86	01/22/87	01/22/87	01/22/87	05/05/87	08/10/87	10/16/87	01/12/88	04/05/86	11/21/86	01/20/87
			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis				FDA	FDB	FDB							FDA
Lab Analysis					LDA	LDB							
Vinyl chloride	2	1	1.3C	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	1.7C	3.3C	2.9C	3.2C	ND	ND	ND	0.27C	11	270C	58C
1,1-Dichloroethane	20	NE	2.0C	0.32C	ND	ND	ND	ND	ND	ND	ND	1.7DL	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.85DL	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	0.36C	2.4C	2.1C	2.2C	2.3C	ND	ND	0.25C	1.1	19C	5.3C
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	0.62C	1.4C	1.2C	1.5C	1.5C	ND	ND	ND	12	290C	71C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10DL	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-59	MW-59	MW-59	MW-59	MW-59 (WELL NUMBER)	MW-59	MW-59	MW-60	MW-60	MW-60	MW-60
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/12/87	04/21/87	04/21/87	08/10/87	08/10/87	10/09/87	01/08/88	05/ /85	09/ /85	05/06/86	10/28/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN			USAF	RADIAN
Date Analyzed			01/20/87	04/23/87	04/23/87	08/17/87	08/17/87	10/12/87	01/11/88			05/16/86	10/29/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC			ANLAB	SAC
Field Analysis			FDB	FDA	FDB	FDA	FDB						
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	99C	47C	50C	19C	15C	15C	3.1PC	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	0.13C	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	8.1C	3.2C	3.3C	1.0C	0.90C	ND	0.21PC	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	108C	38C	40C	13C	11C	6.2C	2.3PC	ND	2.3	5.0	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
USAF = United States Air Force
ANLAB = Anlab Analytical Lab
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-60	MW-60	MW-60	MW-60	MW-60	MW-60	MW-61	MW-61	MW-61	MW-61	MW-61
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/13/87	04/24/87	08/13/87	10/25/87	01/22/88	01/22/88	06/ /85	09/ /85	10/ /85	03/19/86	12/01/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN				RADIAN	RADIAN
Date Analyzed			01/19/87	04/28/87	08/18/87	10/29/87	01/25/88					03/21/86	12/04/86
Lab			SAC	SAC	SAC	SAC	SAC	CES				SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	2.6	3.1	7.4
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/1
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-61	MW-61	MW-61	MW-61	MW-61	MW-61	MW-61	MW-63	MW-63	MW-63	MW-63
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	DEEP	DEEP	DEEP	DEEP
Date Sampled			01/29/87	05/07/87	05/07/87	08/07/87	10/13/87	01/19/88	01/19/88	04/02/86	04/02/86	04/02/86	11/25/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/30/87	05/12/87	05/12/87	08/11/87	10/16/87	01/20/88	01/20/88	04/05/86	04/05/86	04/05/86	12/02/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis										FDA	FDB	FDB	FDA
Lab Analysis				LDA	LDB			LDA	LDB		LDA	LDB	
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.25C
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15DL
Chloroform	100	100	0.16C	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13DL
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	0.4	0.4	0.4	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	22C	15C	23C	14C	5.3C	4.3C	4.1C	40	36	36	20C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-63	MW-63	MW-63	MW-63	MW-63	MW-63	MW-65	MW-65	MW-67	MW-67	MW-67
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/25/86	01/27/87	05/11/87	08/14/87	10/22/87	01/23/88	08/ /85	11/ /85	08/ /85	12/ /85	03/20/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN					RADIAN
Date Analyzed			12/02/86	02/02/87	05/13/87	08/20/87	10/29/87	01/25/88					03/26/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC					SAC
Field Analysis			FDB										
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	0.24C	ND	ND	ND	ND	0.76C	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	0.15DL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	0.15DL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	0.78C	ND	ND	ND	4.7	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	1.1	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	24C	41C	210C	190C	52C	69C	110	77	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-67	MW-67	MW-67	MW-67	MW-67	MW-67	MW-67	MW-67	MW-68	MW-68	MW-68
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			10/17/86	01/23/87	05/06/87	08/15/87	10/20/87	10/20/87	01/26/88	01/26/88	08/ /85	12/ /85	05/13/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN			RADIAN
Date Analyzed			10/21/86	01/29/87	05/11/87	08/19/87	10/27/87	11/24/87	01/28/88	01/28/88			05/18/87
Lab			SAC	SAC	SAC	SAC	SAC	CES	SAC	SAC			SAC
Field Analysis													
Lab Analysis									LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.3	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	0.30C	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-68	MW-68	MW-68	MW-69	MW-69	MW-69	MW-69	MW-69	MW-69	MW-69	MW-70
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			08/07/87	10/23/87	01/25/88	08/ /85	11/25/86	01/28/87	05/13/87	08/01/87	10/20/87	01/23/88	01/29/87
Sampled By			RADIAN	RADIAN	RADIAN		RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/10/87	10/29/87	01/27/88		12/02/86	01/30/87	05/18/87	08/06/87	10/23/87	01/25/88	01/30/87
Lab			SAC	SAC	SAC		SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	0.10C	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	0.10C	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	0.65C	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-70	MW-70	MW-70	MW-70	MW-71	MW-71	MW-72	MW-72	MW-72	MW-72	MW-72
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			05/12/87	08/14/87	10/16/87	01/07/88	09/ /85	10/ /85	05/08/87	08/14/87	10/20/87	10/20/87	01/08/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			05/18/87	08/19/87	10/19/87	01/08/88			05/13/87	08/19/87	10/22/87	11/24/87	01/11/88
Lab			SAC	SAC	SAC	SAC			SAC	SAC	SAC	CES	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	41C	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	0.27C	0.25PC	ND	ND	550C	1900C	520C	320	930PC
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	64C	150C	50C	61	66PC
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	3.2C	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	28C	140C	120C	86	140PC
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	5.9C	43C	23C	7	4.9PC
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	0.79C	ND	ND	ND	ND	410C	1200C	560C	580	870PC
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

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CES = Canonie Environmental Services
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SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-88	MW-88	MW-88	MW-88	MW-88	MW-88	MW-88	MW-89	MW-89	MW-89	MW-89
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/06/87	05/04/87	05/04/87	08/13/87	10/24/87	01/21/88	01/21/88	01/06/87	05/04/87	08/13/87	10/21/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/08/87	05/06/87	05/06/87	08/17/87	10/29/87	01/22/88	01/22/88	01/08/87	05/06/87	08/17/87	10/28/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis								FDA	FDB				
Lab Analysis				LDA	LDB								
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	1.1C	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l

MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-89	MW-90	MW-90	MW-90	MW-90	MW-90	MW-91	MW-91	MW-91	MW-91	MW-91
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/11/88	01/20/87	05/04/87	08/13/87	10/12/87	01/20/88	01/20/87	01/20/87	04/21/87	07/28/87	10/12/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADI.N	RADIAN	RADIAN
Date Analyzed			01/12/88	01/23/87	05/06/87	08/17/87	10/14/87	01/21/88	01/26/87	01/26/87	04/22/87	07/29/87	10/13/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis									FDA	FDB			FDA
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	0.75C	ND	ND	1.6C	0.52C	0.21C	14C	13C	14C	8.1C	3.0C
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	9.9C	9.5C	13C	18C	6.7C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

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SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-91	MW-91	MW-92	MW-92	MW-92	MW-92	MW-92	MW-92	MW-92	MW-100	MW-100
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE
Date Sampled			10/12/87	01/21/88	01/20/87	04/21/87	07/28/87	10/26/87	10/26/87	01/21/88	01/21/88	12/21/85	12/21/85
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/13/87	01/22/88	01/26/87	04/22/87	07/29/87	10/29/87	10/29/87	01/22/88	01/22/88	12/26/85	12/26/85
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDB					FDA	FDB	FDA	FDB	FDA	FDA
Lab Analysis												LDA	LDB
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	3.3C	1.3C	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	6.4C	6.6C	6.2C	7.9C	9.4C	3.8C	3.7C	4.4PC	3.7PC	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

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RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S. EPA Primary MCL	WELL NUMBER MW-100	MW-100	MW-100	MW-100	MW-100	MW-100	MW-100	MW-100	MW-100	MW-100	MW-101
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW
Date Sampled			12/21/85	02/27/86	09/16/86	01/09/87	01/09/87	04/17/87	08/07/87	08/07/87	10/19/87	01/22/88	11/18/85
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			12/26/85	03/11/86	09/23/86	01/15/87	01/15/87	04/21/87	08/13/87	08/11/87	10/21/87	01/26/88	11/24/85
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDB						FDA	FDB			
Lab Analysis						LDA	LDB						LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/18/85	03/05/86	09/16/86	09/16/86	01/09/87	04/17/87	08/05/87	08/05/87	08/05/87	10/19/87	01/22/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/24/85	03/10/86	09/23/86	09/23/86	01/15/87	04/21/87	08/07/87	08/07/87	08/07/87	10/21/87	01/26/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis									FDA	FDA	FDB		
Lab Analysis			LDB		LDA	LDB			LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/04/85	03/11/86	09/18/86	01/09/87	04/22/87	08/07/87	08/07/87	08/07/87	10/19/87	10/19/87	10/19/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/11/85	03/17/86	09/23/86	01/15/87	04/27/87	08/11/87	08/11/87	08/11/87	10/21/87	10/21/87	11/03/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	CES
Field Analysis								FDA	FDA	FDB			
Lab Analysis								LDA	LDB		LDB	LDA	LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1.1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1.2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
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ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-102	MW-103	MW-103	MW-103	MW-103	MW-103	MW-103	MW-103	MW-103	MW-103	MW-103
			WELL NUMBER										
Monitoring Zone			SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			01/20/88	12/20/85	12/20/85	12/20/85	03/11/86	09/18/86	01/09/87	04/22/87	04/22/87	08/04/87	10/19/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/21/88	12/23/85	12/23/85	12/23/85	03/17/86	09/23/86	01/15/87	04/27/87	04/27/87	08/07/87	10/21/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis				FDA	FDB	FDB							
Lab Analysis					LDA	LDB				LDA	LDB		
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-103	MW-104	MW-104	MW-104	MW-104	MW-104	MW-104	MW-104	MW-104	MW-104	MW-104
Monitoring Zone			MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			01/20/88	12/15/85	12/15/85	03/26/86	10/02/86	01/28/87	05/11/87	05/11/87	07/31/87	07/31/87	10/21/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/21/88	12/21/85	12/21/85	04/01/86	10/06/86	01/29/87	05/13/87	05/13/87	08/04/87	08/04/87	10/22/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis				LDA	LDB				LDA	LDB	LDA	LDB	
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-104	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105	MW-105
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			01/21/88	12/21/85	03/27/86	10/08/86	10/08/86	01/07/87	04/22/87	08/11/87	10/23/87	01/22/88	01/22/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/22/88	12/26/85	04/03/86	10/10/86	10/10/86	01/09/87	04/27/87	08/17/87	10/29/87	01/26/88	01/26/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis						FDA	FDB					FDA	FDB
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	0.31C	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l

MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-106	MW-107	MW-107
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/21/85	03/13/86	09/18/86	01/05/87	01/05/87	04/21/87	07/28/87	10/09/87	01/25/88	11/07/85	04/01/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/24/85	03/19/86	09/23/86	01/06/87	01/06/87	04/22/87	07/29/87	10/12/87	01/27/88	11/12/85	04/05/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis						LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-107	MW-107	MW-107	MW-107	MW-107	MW-107	MW-108	MW-108	MW-108	MW-108	MW-108
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			09/19/86	01/07/87	04/23/87	07/30/87	10/12/87	01/14/88	12/27/85	04/01/86	09/19/86	01/07/87	04/22/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			09/24/86	01/09/87	04/24/87	08/03/87	10/13/87	01/15/88	01/02/86	04/05/86	09/24/86	01/09/87	04/24/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-108	MW-108	MW-108	MW-109	MW-109	MW-109	MW-109	MW-109	MW-109	MW-110	MW-110
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW
Date Sampled			07/30/87	10/12/87	01/14/88	11/06/86	01/06/87	04/22/87	07/30/87	10/16/87	01/14/88	11/06/85	03/31/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/03/87	10/13/87	01/15/88	11/11/86	01/08/87	04/24/87	08/03/87	10/20/87	01/15/88	11/11/85	04/03/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-110	MW-110	MW-110	MW-110	MW-110	MW-110	MW-110	MW-110	MW-111	MW-111	MW-111
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			09/19/86	01/05/87	04/23/87	07/29/87	10/21/87	10/21/87	10/21/87	01/18/88	11/06/85	04/03/86	04/03/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			09/24/86	01/06/87	04/24/87	07/30/87	10/23/87	10/22/87	11/09/87	01/19/88	11/11/85	04/08/86	04/08/86
Lab			SAC	SAC	SAC	SAC	SAC	CES	CES	SAC	SAC	SAC	SAC
Field Analysis												FDA	FDA
Lab Analysis												LDA	LDB
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	0.3
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	0.2
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-111	MW-111	MW-111	MW-111	MW-111	MW-111	MW-111	MW-111	MW-112	MW-112	MW-112
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	DEEP	DEEP	DEEP
Date Sampled			04/03/86	09/22/86	01/09/87	04/23/87	07/29/87	10/19/87	01/15/88	01/15/88	12/20/85	04/02/86	09/22/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/08/86	09/24/86	01/16/87	04/24/87	07/30/87	10/21/87	01/18/88		12/26/85	04/06/86	09/24/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	CES	SAC	SAC	SAC
Field Analysis			FDB										
Lab Analysis													LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND
1,1-Dichloroethane	20	NE	0.3	0.18	ND	ND	ND	0.29C	0.72C	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	0.12C	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	0.2	0.30	ND	1.1C	ND	0.39C	0.83C	0.9	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-112	MW-112	MW-112	MW-112	MW-112	MW-112	MW-112	MW-112	MW-113	MW-113	MW-113
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	MIDDLE	MIDDLE	MIDDLE
Date Sampled			09/22/86	01/09/87	04/24/87	07/29/87	07/29/87	10/19/87	10/19/87	01/15/88	11/06/86	01/09/87	04/24/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			09/24/86	01/16/87	04/27/87	07/30/87	07/30/87	10/21/87	11/03/87	01/18/88	11/11/86	01/16/87	04/27/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	CES	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis			LDB			LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	0.15C	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l

MW = Monitoring Well

LDA = First laboratory duplicate analysis

LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento

CES = Canonie Environmental Services

SAC = Radian Analytical Services, Sacramento

ND = Nothing detected

C = Analysis confirmed in second column analysis

NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-113	MW-113	MW-113	MW-114	MW-114	MW-114	MW-114	MW-114	MW-114	MW-114	MW-114
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			07/29/87	10/19/87	01/15/88	11/11/85	02/28/86	10/02/86	01/13/87	04/21/87	08/12/87	10/15/87	01/07/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			07/30/87	10/21/87	01/18/88	11/15/85	03/11/86	10/06/86	01/19/87	04/23/87	08/18/87	10/19/87	01/08/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	0.10	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	0.21	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-114	MW-115	MW-115	MW-115	MW-115	MW-115	MW-115	MW-115	MW-115	MW-115	MW-115
Monitoring Zone			SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			01/07/88	12/19/85	03/06/86	10/09/86	01/19/87	04/20/87	07/27/87	07/27/87	10/08/87	01/07/88	01/07/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed				12/23/85	03/17/86	10/13/86	01/22/87	04/23/87	07/28/87	07/28/87	10/09/87	01/08/88	
Lab			CES	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	CES
Field Analysis													
Lab Analysis									LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-116	MW-116	MW-116	MW-116	MW-116	MW-116	MW-116	MW-116	MW-116	MW-116	MW-116
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/11/85	11/11/85	11/11/85	02/28/86	02/28/86	09/26/86	01/14/87	04/27/87	08/03/87	10/09/87	01/13/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/15/85	11/15/85	11/15/85	03/11/86	03/11/86	09/29/86	01/19/87	04/30/87	08/06/87	10/12/87	01/14/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDA	FDB	FDB								
Lab Analysis				LDA	LDB	LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	0.3	0.2	0.48	0.39C	ND	1.1C	0.32C	0.29PC
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	0.2	0.3	0.23	ND	0.47C	0.25C	ND	0.12PC

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-117	MW-117	MW-117	MW-118	MW-118	MW-119	MW-119	MW-119	MW-120	MW-120	MW-120
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW
Date Sampled			04/20/86	10/20/86	10/20/86	03/25/86	10/21/86	03/05/86	03/05/86	10/20/86	04/20/86	10/13/86	10/13/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/22/86	10/22/86	10/22/86	03/31/86	10/22/86	03/15/85	03/15/86	10/22/86	04/22/86	10/17/86	10/17/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis				FDA	FDB							FDA	FDB
Lab Analysis								LDA	LDB				
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	0.6	2.1C	2.3C	ND	0.95	ND	ND	ND	1.2	1.8C	1.9C
1,2-Dichloroethane	1	5	0.2	ND	1.0C	ND	ND	ND	ND	ND	0.2	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	17	19C	21C	ND	1.0	ND	ND	ND	24	20C	20C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-120	MW-120	MW-120	MW-120	MW-120	MW-120	MW-120	MW-121	MW-121	MW-121	MW-121
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			01/20/87	01/20/87	04/20/87	08/08/87	10/22/87	01/23/88	01/23/88	02/26/86	10/13/86	01/23/87	04/25/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/26/87	01/23/87	04/23/87	08/10/87	10/27/87	01/25/88	01/25/88	03/10/86	10/16/86	01/29/87	04/28/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDA	FDB									
Lab Analysis								LDA	LDB				
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	0.90C	0.85C	0.77C	0.68C	0.50C	0.34C	0.35C	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	0.19C	0.20C	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	19.32C	17.35	25C	26C	9.3C	8.8C	7.8C	0.2	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-121	MW-121	MW-121	MW-122	WELL NUMBER MW-122	MW-122	MW-122	MW-122	MW-122	MW-122	MW-123
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW
Date Sampled			08/01/87	10/22/87	01/23/88	02/26/86	11/12/86	01/26/87	05/07/87	08/08/87	10/22/87	01/23/88	04/04/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/10/87	10/27/87	01/29/88	03/10/86	11/20/86	01/29/87	05/12/87	08/10/87	10/27/87	01/25/88	04/09/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.1
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-123	MW-124	MW-124	MW-124	MW-125	MW-126	MW-127	MW-127	MW-128	MW-128	MW-128
Monitoring Zone			SHALLOW	MIDDLE	MIDDLE	MIDDLE	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW
Date Sampled			10/21/86	02/25/86	11/24/86	11/24/86	02/25/86	03/03/86	03/04/86	10/24/86	12/05/86	01/16/87	04/16/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/22/86	03/10/86	12/01/86	12/01/86	03/10/86	03/12/86	03/14/86	10/29/86	12/09/86	01/21/87	04/17/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													FDA
Lab Analysis					LDA	LDB							
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	5.7DL	ND	ND
1.1-Dichloroethane	20	NE	0.21C	ND	ND	ND	ND	ND	ND	ND	1.4DL	ND	1.2DL
Chloroform	100	100	0.76	ND	ND	ND	ND	ND	ND	ND	48DL	ND	54DL
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	41DL	ND	63DL
1,1,1-Trichloroethane	200	200	ND	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	7.1C	ND	ND	0.60	ND	ND	ND	1.3	41000C	28200C	27000C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	0.15	ND	ND	19DL

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-128	MW-128	MW-128	MW-128	MW-128	MW-129	MW-129	MW-129	MW-129	MW-129	MW-129
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			04/16/87	08/12/87	09/17/87	10/23/87	01/13/88	12/05/86	01/16/87	04/15/87	08/12/87	10/23/87	01/13/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/17/87	08/18/87	09/22/87	10/30/87	01/14/88	12/09/86	01/21/87	04/16/87	08/18/87	10/29/87	01/14/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDB										
Lab Analysis													
Vinyl chloride	2	1	ND	ND	1.2DL	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	5.5DL	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	1.2DL	ND	1.2DL	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	58DL	ND	57DL	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	56DL	ND	75DL	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	55000C	68000C	36000C	27000C	19000PC	130C	10C	48C	610C	45C	11C
Tetrachloroethene	4	NE	23DL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
P or PC = Identity previously confirmed
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-130	MW-130	MW-130	MW-130	MW-130	MW-130	MW-130	MW-130	MW-131	MW-131	MW-131
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/13/86	01/16/87	04/15/87	07/29/87	07/29/87	10/27/87	10/27/87	01/13/88	11/19/86	11/19/86	01/19/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/20/86	01/21/87	04/16/87	07/30/87	07/30/87	10/30/87	10/30/87	01/14/88	12/02/86	12/02/86	01/22/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis						FDA	FDB	FDA	FDB		FDA	FDB	FDA
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	3.2C	4.0C	6.1C	8.6C	7.8C	2.5C	2.3C	2.9PC	ND	ND	ND
1,1-Dichloroethane	20	NE	7.8C	7.9C	7.6C	11C	10C	2.5C	2.4C	3.8PC	ND	ND	ND
Chloroform	100	100	ND	ND	0.43C	ND	ND	0.21C	0.28C	0.29PC	0.17DL	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	0.97C	0.80C	1.3C	1.2C	ND	0.85C	0.93C	0.61PC	ND	0.78DL	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	2.6C	1.9C	3.2C	4.0C	4.0C	1.2C	1.1C	2.0PC	27C	29C	19C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
P or PC = Identity previously confirmed
NE = Not established

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SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-131	MW-131	MW-131	MW-131	MW-131	MW-131	MW-132	MW-132	MW-132	MW-132	MW-132
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			01/19/87	04/28/87	08/07/87	10/14/87	10/14/87	01/19/88	11/24/86	01/21/87	05/15/87	05/15/87	07/29/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/22/87	04/30/87	08/13/87	10/16/87	10/16/87	01/20/88	12/01/86	01/26/87	05/19/87	05/19/87	07/30/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDB			FDA	FDB				FDA	FDB	FDA
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	0.33DL	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	0.30C	0.51DL	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	0.31C	0.70DL	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	0.24C	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	19C	30C	120C	40C	55C	32C	90C	62C	100C	110C	110C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
DL = Diluted out of the confirmation run
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-132	MW-132	MW-132	MW-132	MW-132	MW-133	MW-134	MW-134	MW-135	MW-136	MW-136
			WELL NUMBER										
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	MIDDLE	DEEP	DEEP
Date Sampled			07/29/87	10/24/87	10/24/87	01/22/88	01/22/88	02/08/88	02/08/88	02/08/88	02/08/88	03/10/88	03/10/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			07/30/87	10/29/87	10/29/87	01/25/88		02/10/88	02/10/88	02/10/88	02/10/88	03/15/88	
Lab			SAC	SAC	SAC	SAC	CES	SAC	SAC	SAC	SAC	SAC	CES
Field Analysis			FDB	FDA	FDB								
Lab Analysis									LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	0.32C	ND	0.48PC	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1
Chloroform	100	100	ND	ND	ND	ND	0.9	ND	ND	ND	0.96C	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	0.90PC	ND	ND	ND	ND	0.74C	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	110C	110C	130	77PC	51.0	ND	ND	ND	30C	230C	230
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-137	MW-138	MW-138	MW-139	MW-140	MW-141	MW-142	MW-143	MW-143	MW-1000	MW-1000
			WELL NUMBER										
Monitoring Zone			DEEP	DEEP	DEEP	SHALLOW	DEEP	DEEP	DEEP	DEEP	DEEP	MIDDLE	MIDDLE
Date Sampled			02/10/88	03/11/88	03/11/88	02/09/88	02/09/88	02/09/88	02/09/88	02/10/88	02/10/88	12/12/85	03/07/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			02/11/88	03/15/88	03/15/88	02/10/88	02/10/88	02/10/88	02/10/88	02/11/88	02/11/88	12/21/85	03/14/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis				FDA	FDB								
Lab Analysis										LDA	LDB		
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	1.0C	ND	1.2C	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	7.7C	ND	ND	10C	ND	5.3C	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	1.1C	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	1.8C	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	350C	ND	ND	89C	56C	90C	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S. EPA Primary MCL	MW-1000	MW-1000	MW-1000	MW-1000	MW-1000	MW-1000	MW-1001	MW-1001	MW-1001	MW-1001	MW-1001
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			10/03/86	01/13/87	04/27/87	08/01/87	10/08/87	01/13/88	12/18/85	04/04/86	10/15/86	01/26/87	05/08/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/06/86	01/19/87	04/29/87	08/04/87	10/09/87	01/14/88	12/23/85	04/09/86	10/20/86	01/29/87	05/12/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1.1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	0.83B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	0.30	ND	0.94C	0.86C	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
B = Compound detected in laboratory blank - not edited
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1001	MW-1001	MW-1001	MW-1001	MW-1001	MW-1001	MW-1002	MW-1002	MW-1002	MW-1002	MW-1002
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			08/08/87	10/09/87	10/09/87	01/20/88	01/20/88	01/20/88	11/07/85	11/07/85	04/02/86	04/02/86	09/25/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/10/87	10/12/87	10/12/87	01/21/88	01/21/88		11/12/85	11/12/85	04/06/86	04/06/86	09/26/86
Lab			SAC	SAC	SAC	SAC	SAC	CES	SAC	SAC	SAC	SAC	SAC
Field Analysis											FDA	FDB	
Lab Analysis				LDA	LDB	LDB	LDA	LDA	LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	2.4	2.3	1.0	0.9	3.3C
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	0.2	0.2	0.33C
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	1.1	1.1	0.9	0.9	1.7C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1002	MW-1002	MW-1002	MW-1002	MW-1002	MW-1003	MW-1003	MW-1003	MW-1003	MW-1003	MW-1003
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			02/04/87	05/04/87	08/08/87	10/15/87	01/21/88	12/18/85	03/18/86	10/15/86	01/23/87	05/08/87	08/08/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			02/06/87	05/06/87	08/10/87	10/19/87	01/22/88	12/23/85	03/26/86	10/20/86	01/27/87	05/12/87	08/11/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	1.8C	0.98C	0.96PC	ND	ND	0.16C	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	0.16C	0.16PC	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	0.42C	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND
Trichloroethene	5	5	ND	1.2C	ND	0.32C	0.39PC	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1003	MW-1003	MW-1003	MW-1004	MW-1004	MW-1004	MW-1004	MW-1004	MW-1004	MW-1004	MW-1004
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			08/08/87	10/09/87	01/20/88	12/18/85	12/18/85	03/18/86	09/29/86	09/29/86	01/26/87	05/08/87	08/08/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/11/87	10/12/87	01/21/88	12/23/85	12/23/85	03/20/86	10/02/86	10/02/86	02/05/87	05/12/87	08/11/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis									FDA	FDB			
Lab Analysis			LDB			LDA	LDB						
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	120	50	59	100C	91C	62C	160C	150C
1,1-Dichloroethane	20	NE	ND	ND	ND	11	ND	7.3	8.7C	9.2C	8.1C	8.8C	6.3C
Chloroform	100	100	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	0.7	1.9C	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	2.1	2.1	3.2	1.4C	1.5C	1.7C	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	14	14	15	26C	23C	18C	27C	24C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1004	MW-1004	MW-1004	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			10/09/87	10/09/87	01/20/88	12/17/85	03/14/86	03/14/86	09/25/86	09/25/86	01/09/87	01/09/87	04/16/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/12/87	10/13/87	01/21/88	12/23/85	03/19/86	03/19/86	09/29/86	09/29/86	01/19/87	01/19/87	04/20/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDA	FDB					FDA	FDB	FDA	FDB	FDA
Lab Analysis							LDA	LDB					
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	0.41NC	0.43C	ND	ND	ND
1,1-Dichloroethene	6	7	41C	40C	23PC	160	86	99	110C	110C	100C	102C	160C
1,1-Dichloroethane	20	NE	2.4C	2.6C	1.6PC	41	14	15	26C	25C	12C	12C	12C
Chloroform	100	100	0.24C	0.30C	ND	0.7	0.1	0.2	1.2NC	2.8NC	0.56DL	ND	ND
1,2-Dichloroethane	1	5	0.79C	0.88C	0.40PC	5	9.1	9.8	14C	13C	5.7C	5.7C	6.0C
1,1,1-Trichloroethane	200	200	0.90C	1.1C	0.6PC	16	5.6	5.0	1.78C	1.6BC	2.6C	ND	3.3C
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	6.2C	7.2C	3.6PC	100	47C	62	80C	76C	59C	54C	53C
Tetrachloroethene	4	NE	ND	ND	ND	ND	0.1	0.1	0.32NC	0.33NC	0.21DL	0.18DL	0.26C

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

NC = Result was not confirmed in second column analysis
ND = Nothing detected
B = Compound detected in laboratory blank - not edited
DL = Diluted out of the confirmation run
P or PC = Identity previously confirmed
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1005	MW-1009	MW-1009	MW-1009
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			04/16/87	04/16/87	07/31/87	07/31/87	10/15/87	10/15/87	01/19/88	01/19/88	12/19/85	03/21/86	10/09/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/20/87	04/21/87	08/03/87	08/03/87	10/19/87	10/19/87	01/20/88	01/20/88	12/23/85	04/01/86	10/13/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDB	FDB	FDA	FDB	FDA	FDB	FDA	FDB			
Lab Analysis			LDA	LDB									
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	140C	150C	270C	280C	79C	77C	58PC	51PC	ND	ND	ND
1,1-Dichloroethane	20	NE	27C	16C	19C	24C	7.5C	6.4C	5.2PC	5.2PC	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	7.9C	6.0C	ND	ND	5.1C	3.8C	2.2PC	2.0PC	ND	ND	ND
1,1,1-Trichloroethane	200	200	4.3C	3.3C	2.3C	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	95C	54C	77C	86C	22C	22	14PC	15PC	ND	ND	ND
Tetrachloroethene	4	NE	0.37C	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1009	MW-1009	MW-1009	MW-1009	MW-1009	MW-1009	MW-1010	MW-1010	MW-1010	MW-1010	MW-1010
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			02/03/87	04/17/87	07/31/87	10/15/87	01/18/88	01/18/88	04/08/86	04/08/86	10/23/86	01/13/87	05/04/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			02/05/87	04/21/87	08/03/87	10/19/87	01/19/88	01/19/88	04/10/86	04/10/86	10/24/86	01/19/87	05/06/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis							FDA	FDB	FDA	FDB			
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1010	MW-1010	MW-1010	MW-1011	MW-1011	MW-1011	MW-1011	MW-1011	MW-1011	MW-1011	MW-1011
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			07/31/87	10/15/87	01/18/88	11/05/85	03/27/86	10/06/86	01/06/87	04/27/87	08/05/87	10/22/87	01/25/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/03/87	10/18/87	01/19/88	11/11/85	03/31/86	10/09/86	01/08/87	04/29/87	08/07/87	10/28/87	01/27/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.25C	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

WELL NUMBER applies to all MW columns.

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1012	MW-1012	MW-1012	MW-1012	MW-1012	MW-1012	MW-1012	MW-1012	MW-1013	MW-1013	MW-1013
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			11/15/85	03/06/86	09/24/86	01/23/87	05/05/87	07/27/87	10/26/87	01/21/88	11/12/85	03/11/86	10/07/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/22/85	03/17/86	09/26/86	01/27/87	05/06/87	07/28/87	10/29/87	01/22/88	11/15/85	03/18/86	10/13/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	0.2	ND	ND	ND	ND	0.28C	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1013	MW-1013	MW-1013	MW-1013	MW-1013	MW-1013	MW-1013	MW-1013	MW-1013	MW-1014	MW-1014
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/15/87	04/20/87	04/20/87	04/20/87	08/03/87	08/03/87	10/22/87	10/22/87	01/19/88	11/14/85	11/14/85
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/20/87	04/22/87	04/22/87	04/22/87	08/06/87	08/06/87	10/28/87	10/28/87	01/20/88	11/15/85	11/22/85
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis				FDA	FDB	FDB							
Lab Analysis					LDA	LDB	LDA	LDB	LDA	LDB		LDA	LDB
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1014	MW-1014	MW-1014	MW-1014	MW-1014	MW-1014	MW-1014	MW-1015	MW-1015	MW-1015	MW-1015
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			03/12/86	10/06/86	01/16/87	04/27/87	08/01/87	10/26/87	01/25/88	12/14/85	03/25/86	10/07/86	01/14/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			03/18/86	10/09/86	01/21/87	04/29/87	08/05/87	10/29/87	01/27/88	12/21/85	03/31/86	10/10/86	01/20/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1015	MW-1015	MW-1015	MW-1015	MW-1016	MW-1016	MW-1016	MW-1016	MW-1016	MW-1016	MW-1016
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			05/04/87	08/01/87	10/17/87	01/19/88	11/14/85	03/12/86	10/07/86	01/16/87	05/07/87	08/01/87	10/16/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			05/06/87	08/05/87	10/20/87	01/20/88	11/22/85	03/18/86	10/09/86	01/21/87	05/11/87	08/05/87	10/20/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	0.11	ND	0.33	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1016	MW-1016	MW-1017	MW-1017	MW-1017	MW-1017	MW-1017	MW-1017	MW-1017	MW-1017	MW-1018
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			10/16/87	01/12/88	11/08/85	03/18/86	09/23/86	01/20/87	04/20/87	07/28/87	10/17/87	01/21/88	11/18/85
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/20/87	01/13/88	11/12/85	03/20/86	09/24/86	01/26/87	04/22/87	07/29/87	10/20/87	01/22/88	11/24/85
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis			LDB										
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	(0.7)
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1018	MW-1018	MW-1018	MW-1018	MW-1018 (WELL NUMBER)	MW-1018	MW-1018	MW-1019	MW-1019	MW-1019	MW-1019
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			03/12/86	09/23/86	02/04/87	05/01/87	08/04/87	10/08/87	01/14/88	12/19/85	04/08/86	09/24/86	01/09/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			03/18/86	09/24/86	02/05/87	05/05/87	08/07/87	10/09/87	01/15/88	12/23/85	04/10/86	09/26/86	01/16/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	0.4	0.81NC	0.59C
Chloroform	100	100	0.1	0.17	ND	ND	ND	0.13C	0.10PC	0.5	0.1	0.56NC	0.17C
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	0.7	0.94	ND	1.7C	1.4C	0.57C	0.54PC	0.5	2.0	1.6C	1.3C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND	0.22C

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

NC = Result was not confirmed in second column analysis
ND = Nothing detected
P or PC = Identity previously confirmed
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1019	MW-1019	MW-1019	MW-1019	MW-1019	MW-1019	MW-1020	MW-1020	MW-1020	MW-1020	MW-1020
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			04/20/87	04/20/87	08/07/87	10/21/87	01/25/88	01/25/88	11/08/85	03/07/86	10/03/86	10/03/86	01/13/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/22/87	04/22/87	08/13/87	10/28/87	01/27/88	01/27/88	11/12/85	03/14/86	10/06/86	10/06/86	01/19/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis			FDA	FDB			FDA	FDB					
Lab Analysis											LDA	LDB	
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	0.11C	0.10C	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	2.0C	2.1C	4.0C	1.4C	1.5C	1.3C	ND	ND	ND	ND	ND
Chloroform	100	100	0.31C	0.32C	ND	0.27C	0.30C	0.26C	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	0.68C	0.26C	ND	ND	ND	ND	0.78B	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	2.6C	3.7C	4.0C	1.5C	1.7C	1.3C	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	1.1C	1.1C	1.2C	1.1C	0.61C	0.53C	ND	ND	0.16	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
B = Compound detected in laboratory blank - not edited
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1020	MW-1020	MW-1020	MW-1020	MW-1020	MW-1021	MW-1021	MW-1021	MW-1021	MW-1021	MW-1021
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			04/30/87	08/01/87	10/08/87	01/13/88	01/13/88	11/07/86	01/26/87	01/26/87	04/27/87	08/03/87	10/27/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			05/04/87	08/05/87	10/09/87	01/14/88	01/14/88	11/20/86	02/03/87	02/03/87	04/29/87	08/07/87	11/02/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis						FDA	FDB						
Lab Analysis									LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	0.23C	ND	ND	ND	ND	0.19C
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	0.30C	ND	ND	ND	ND	57C	32C	32	57C	46C	17C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	2.8C	ND	ND	5.6C	2.7C	3.3C

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

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CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1021	MW-1021	MW-1022	MW-1022	MW-1022	MW-1022	MW-1022	MW-1022	MW-1022	MW-1023	MW-1023
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	SHALLOW	SHALLOW
Date Sampled			10/27/87	01/19/88	11/07/86	01/23/87	04/27/87	08/03/87	10/20/87	10/20/87	01/19/88	11/04/86	01/19/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/04/87	01/20/88	11/11/86	01/27/87	04/29/87	08/06/87	10/23/87	11/24/87	01/20/88	11/06/86	01/26/87
Lab			CES	SAC	SAC	SAC	SAC	SAC	SAC	CES	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	0.19PC	0.49C	0.21C	ND	ND	0.12C	ND	0.12PC	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	18B	11PC	13C	ND	20C	21C	7.6C	9.4	4.8PC	ND	ND
Tetrachloroethene	4	NE	0.8	1.3PC	0.54C	0.57C	1.0C	0.77C	0.94C	ND	0.36PC	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
B = Compound detected in laboratory blank - not edited
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1023	MW-1023	MW-1023	MW-1023	MW-1023	MW-1024	MW-1024	MW-1024	MW-1024	MW-1024	MW-1024
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			04/15/87	08/11/87	10/22/87	01/13/88	01/13/88	11/04/86	01/19/87	01/19/87	04/15/87	04/15/87	08/11/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/16/87	08/13/87	10/28/87	01/14/88	01/14/88	11/06/86	01/26/87	01/26/87	04/16/87	04/16/87	08/13/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis						LDA	LDB		LDA	LDB	LDA	LDB	
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1024	MW-1024	MW-1025	MW-1025	MW-1025	MW-1025	MW-1025	MW-1025	MW-1026	MW-1026	MW-1026
			WELL NUMBER										
Monitoring Zone			MIDDLE	MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW
Date Sampled			10/15/87	01/12/88	11/03/86	01/19/87	04/15/87	08/11/87	10/15/87	01/12/88	11/05/86	01/14/87	04/17/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/18/87	01/13/88	11/06/86	01/26/87	04/16/87	08/13/87	10/18/87	01/13/88	11/11/86	01/20/87	04/21/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1026	MW-1026	MW-1026	MW-1026	MW-1026	MW-1027	MW-1027	MW-1027	MW-1027	MW-1027	MW-1027
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			08/05/87	10/14/87	10/14/87	01/15/88	01/15/88	11/25/86	01/14/87	01/14/87	04/17/87	08/05/87	10/14/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/07/87	10/19/87	10/18/87	01/18/88	01/18/88	12/02/86	01/20/87	01/20/87	04/21/87	08/07/87	10/16/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis				LDA	LDB	LDA	LDB		LDA	LDB			
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1027	MW-1028	MW-1028	MW-1028	MW-1028	MW-1029	MW-1029	MW-1029	MW-1029	MW-1029	MW-1029
Monitoring Zone			MIDDLE	DEEP	DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/15/88	08/07/87	10/14/87	10/14/87	01/15/88	11/11/86	11/11/86	11/11/86	01/08/87	01/08/87	04/29/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/18/88	08/13/87	10/16/87	11/09/87	01/18/88	11/19/86	11/19/86	11/19/86	01/13/87	01/13/87	05/01/87
Lab			SAC	SAC	SAC	CES	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis								FDA	FDA	FDB	FDA	FDB	
Lab Analysis								LDA	LDB				
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	0.17C	0.19C	0.19C	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	6.8C	6.7C	6.3C	4.7C	5.3C	6.4C
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	1.1C	1.2C	1.1C	0.78C	0.85C	3.0C
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1029	MW-1029	MW-1029	MW-1029	MW-1029	MW-1030	MW-1030	MW-1030	MW-1030	MW-1030	MW-1030
			WELL NUMBER										
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			08/07/87	10/12/87	10/12/87	10/12/87	01/18/88	11/11/86	01/08/87	04/29/87	08/07/87	10/12/87	01/17/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			08/13/87	10/13/87	10/13/87	10/13/87	01/20/88	11/19/86	01/13/87	05/01/87	08/13/87	10/14/87	01/20/88
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis				FDA	FDB	FDB							
Lab Analysis					LDA	LDB							
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	6.3C	1.6C	2.2C	1.9C	2.5C	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	0.40C	0.71C	0.46C	0.25C	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	4.3C	1.4C	1.8C	1.7C	1.7C	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	MW-1031	MW-1031	MW-1031	MW-1031	MW-1031	MW-1031	MW-1031	MW-1032	MW-1032	MW-1032	MW-1032
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			11/18/86	01/08/87	04/29/87	08/10/87	10/12/87	10/12/87	01/17/88	11/19/86	01/13/87	05/01/87	08/04/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/21/86	01/13/87	05/01/87	08/14/87	10/13/87	10/13/87	01/20/88	11/22/86	01/19/87	05/05/87	08/07/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis							FDA	FDB					
Lab Analysis													
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1032	MW-1032	MW-1033	MW-1033	MW-1033	MW-1033	MW-1033	MW-1033	MW-1033	MW-1034	MW-1034
Monitoring Zone			MIDDLE	MIDDLE	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE
Date Sampled			10/09/87	01/14/88	11/12/86	01/08/87	04/28/87	08/10/87	10/13/87	01/12/88	01/12/88	11/12/86	01/08/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			10/12/87	01/15/88	11/20/86	01/13/87	04/29/87	08/14/87	10/14/87	01/13/88	01/13/88	11/20/86	01/13/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis										LDA	LDB		
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1034	MW-1034	MW-1034	MW-1034	MW-1034	MW-1034	MW-1035	MW-1035	MW-1035	MW-1035	MW-1035
Monitoring Zone			MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			04/28/87	08/10/87	10/13/87	10/13/87	01/12/88	01/12/88	11/25/86	01/08/87	04/28/87	08/10/87	10/13/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			04/30/87	08/14/87	10/14/87	10/14/87	01/13/88	01/13/88	12/02/86	01/13/87	04/29/87	08/14/87	10/14/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis							FDA	FDB					
Lab Analysis					LDA	LDB							
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	0.20C	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1035	MW-1036	MW-1036	MW-1036	MW-1036	MW-1036	MW-1036	MW-1036	MW-1036	MW-1036	MW-1037
Monitoring Zone			DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			01/12/88	11/19/86	01/16/87	01/16/87	04/23/87	08/06/87	10/21/87	10/21/87	01/14/88	01/14/88	10/31/86
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/13/88	11/22/86	01/21/87	01/21/87	04/24/87	08/10/87	10/23/87	10/23/87	01/15/88	01/15/88	11/03/86
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis									FDA	FDB	FDA	FDB	
Lab Analysis					LDA	LDB							
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	0.15	ND	ND	ND	ND	0.12C	0.11C	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	0.86	0.63C	0.79	1.2C	ND	0.51C	0.55C	0.32PC	0.25PC	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
P or PC = Identity previously confirmed
NE = Not established

RADIAN
CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1037	MW-1037	MW-1037	MW-1037	MW-1037	MW-1038	MW-1038	MW-1038	MW-1038	MW-1038	MW-1038
Monitoring Zone			SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Date Sampled			01/15/87	05/07/87	08/12/87	10/13/87	01/15/88	11/20/86	11/20/86	01/15/87	04/30/87	08/04/87	10/13/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/21/87	05/11/87	08/18/87	10/14/87	01/18/88	11/24/86	11/24/86	01/21/87	05/04/87	08/07/87	10/16/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis								LDA	LDB				
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	0.19	0.17	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	1.4	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1038	MW-1039	MW-1039	MW-1039	MW-1039	MW-1039	MW-1039	MW-1039	MW-1040	MW-1040	MW-1040
Monitoring Zone			MIDDLE	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			01/15/88	11/20/86	01/15/87	01/15/87	04/30/87	08/03/87	10/13/87	01/27/88	11/17/86	01/21/87	05/05/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			01/18/88	11/24/86	01/21/87	01/13/87	05/04/87	08/06/87	10/16/87	01/29/88	11/21/86	01/27/87	05/06/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis					LDA	LDB							
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	0.75C	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1040	MW-1040	MW-1040	MW-1041	MW-1041	MW-1041	M-1041	MW-1041	MW-1041	MW-1041	MW-1041
Monitoring Zone			DEEP	DEEP	DEEP	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
Date Sampled			07/27/87	10/20/87	01/20/88	11/14/86	11/14/86	01/22/87	01/22/87	05/06/87	08/06/87	10/14/87	10/14/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			07/28/87	10/23/87	01/21/88	11/20/86	11/20/86	01/28/87	01/28/87	05/11/87	08/10/87	10/18/87	10/18/87
Lab			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis						FDA	FDB	FDA	FDB				
Lab Analysis												LDB	LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	16C	1.0	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
FDA = First field duplicate analysis
FDB = Second field duplicate analysis
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
C = Analysis confirmed in second column analysis
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1041	MW-1041	MW-1042	MW-1042	MW-1042	MW-1042	MW-1042	MW-1042	MW-1043	MW-1043	MW-1043
Monitoring Zone			SHALLOW	SHALLOW	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE	DEEP	DEEP	DEEP
Date Sampled			10/14/87	01/18/88	11/21/86	01/22/87	05/06/87	08/06/87	10/14/87	01/18/88	11/21/86	01/22/87	05/06/87
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			11/09/87	01/19/88	11/25/86	01/28/87	05/11/87	08/10/87	10/18/87	01/19/88	11/25/86	01/28/87	05/11/87
Lab			CES	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
Field Analysis													
Lab Analysis			LDA										LDA
Vinyl chloride	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	0.41	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
CES = Canonie Environmental Services
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

SUMMARY OF COMMONLY DETECTED ANALYTES IN MONITORING WELLS FROM 1981 TO 1988, McCLELLAN AFB

Parameter	DOHS Action Level	U.S.EPA Primary MCL	WELL NUMBER MW-1043	MW-1043	MW-1043	MW-1043	MW-1043
Monitoring Zone			DEEP	DEEP	DEEP	DEEP	DEEP
Date Sampled			05/06/87	08/06/87	10/14/87	01/18/88	01/18/88
Sampled By			RADIAN	RADIAN	RADIAN	RADIAN	RADIAN
Date Analyzed			05/11/87	08/10/87	10/18/87	01/19/88	01/19/88
Lab			SAC	SAC	SAC	SAC	SAC
Field Analysis							
Lab Analysis			LDB			LDA	LDB
Vinyl chloride	2	1	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	7	ND	ND	ND	ND	ND
1,1-Dichloroethane	20	NE	ND	ND	ND	ND	ND
Chloroform	100	100	ND	ND	ND	ND	ND
1,2-Dichloroethane	1	5	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	200	ND	ND	ND	ND	ND
Carbon tetrachloride	5	5	ND	ND	ND	ND	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND
Tetrachloroethene	4	NE	ND	ND	ND	ND	ND

ALL UNITS ARE ug/l
MW = Monitoring Well
LDA = First laboratory duplicate analysis
LDB = Second laboratory duplicate analysis

RADIAN = Radian Corporation, Sacramento
SAC = Radian Analytical Services, Sacramento

ND = Nothing detected
NE = Not established

RADIAN CORPORATION

APPENDIX C

Summary of Volatile Organic Compounds Detected in Base Production Wells

TABLE C-1. SUMMARY OF VOLATILE ORGANIC COMPOUND CONCENTRATIONS DETECTED IN BASE PRODUCTION WELLS

Monitoring Wells		TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
		Compounds (ug/L)						
	DOHS Action Levels:	5	5	100	16	200	6	1
	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
AREA A AND ADJACENT ON-BASE AREAS								
BW-1								
11/79 - Well taken out of service due to contamination.								
01/80		TR						
03/80		53	.5-8.7					
05/80		230 to 716	17-34					
07/80		100			79	4.2		13
12/81		1,500		24	23			
Well is currently out of service on 03/80 due to contamination.								
BW-2								
11/79								
07/80		2.9						
08/80		110						
12/81		10				<10	175	
Well is currently out of service on 11/79 due to contamination.								
BW-11								
08/79* - Initial sampling.			8					
12/81*								
Well is no longer on base property.								

* = No purgeable halocarbons of interest detected during sampling.
TR = Trace (terminology used by USAF to quantify low levels of analytes).
NE = Not established.

(Continued)

McSEMIAN/071688/JKS

TABLE C-1. (Continued)

Monitoring Wells		Compounds (ug/L)						
		TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
Monitoring	DOHS Action Levels:	5	5	100	16	200	6	1
Wells	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
AREA B AND ADJACENT ON-BASE AREAS (Continued)								
BW-12								
04/80		8						
06/80 to 08/80 20								
08/80		35						
05/81		27						
07/81		54						
12/81*								
Well is currently out of service on 08/80 due to contamination.								
BW-7								
CIRCA 1956 - Well contaminated with unspecified hydrocarbons and phenols.								
CIRCA 1970 - Well abandoned (destroyed).								
AREA B AND ADJACENT ON-BASE AREAS								
BW-13								
04/80		9						
08/80		24						
12/81*								
10/85		<0.5	0.8	0.7				
11/85		<0.5						
12/85		<0.5						
01/86		<0.5						
02/86		<0.5						

* = No purgeable halocarbons of interest detected during sampling.
TR = Trace (terminology used by USAF to quantify low levels of analytes).
NE = Not established.

(Continued)

McSEMIAN/071688/JKS

TABLE C-1. (Continued)

Monitoring Wells		TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
		Compounds (ug/L)						
Monitoring	DOHS Action Levels:	5	5	100	16	200	6	1
Wells	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
AREA B AND ADJACENT ON-BASE AREAS (Continued)								
BW-13 (Continued)								
03/86*								
04/86		0.7	0.6					
05/86		0.7	1.1					
06/86		<0.5	1.0	1.3				0.5
07/86		<0.5	1.3					
08/86		<0.5	1.3					
09/86		<0.5(TR)	1.1					
10/86		<0.5	1.5	0.6				
11/86		<0.5	1.1					
12/86		<0.5	0.9	0.6				
01/87		<0.5						
02/87		<0.5						
03/87		<0.5		2.1				
04/87		TR	1.5	2.1		TR		
05/87		TR	0.8	TR				
06/87		1.4	7.8	1.3				
07/87		1.0	5.5					
08/87		1.2	6.0	0.8				
09/87		1.5	6.8	1.0				
05/88		2.3	3.3	0.7				
BW-17								
12/81*								
05/85 - Well taken out of service "due to high levels of carbon tetrachloride."								

* = No purgeable halocarbons of interest detected during sampling.
TR = Trace (terminology used by USAF to quantify low levels of analytes).
NE = Not established.

(Continued)

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TABLE C-1. (Continued)

Monitoring Wells		TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
		Compounds (ug/L)						
Monitoring	DOHS Action Levels:	5	5	100	16	200	6	1
Wells	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
AREA B AND ADJACENT ON-BASE AREAS (Continued)								
BW-18								
08/79		3.9/4.5						
01/80		12						
06/80 to 08/80		20						
02/80 to 03/80		9						
05/81		140						
07/81		63						
12/81*								
12/85		8.6			1.4			
03/86								4.0
10/86		16.8						
12/86		25						
09/87		36.5	TR	2.0	1.4	TR		
10/87		14.7						TR
11/87		11.7						
01/88		14.3	TR	TR	2.0			<0.5
OTHER ON-BASE AREAS								
BW-10								
08/79* - Initial sampling.								
10/85		<0.5		0.8				
11/85		<0.5						
12/85		<0.5						
01/86		<0.5						

* = No purgeable halocarbons of interest detected during sampling.
TR = Trace (terminology used by USAF to quantify low levels of analytes).
NE = Not established.

(Continued)

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TABLE C-1. (Continued)

Monitoring Wells		TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
		Compounds (ug/L)						
Monitoring	DOHS Action Levels:	5	5	100	16	200	6	1
Wells	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
OTHER ON-BASE AREAS (Continued)								
BW-10 (Continued)								
02/86		<0.5						
03/86		<0.5						9.5
04/86		<0.5						
05/86		<0.5		0.6				
06/86		<0.5						
07/86		<0.5						
08/86		<0.5	<0.5(TR)					
09/86		<0.5						
10/86		<0.5						
11/86		<0.5						
12/86		<0.5						
01/87 to 12/87 - Only chloroform ranging in concentrations from trace to 2.5 were detected.								
10/87							100	330
BW-28								
08/79 - Initial sampling								
12/81		TR						
10/85		<0.5		1.4				
11/85		<0.5						
12/85		<0.5						
01/86		<0.5						
02/86		<0.5				0.6		
03/86		<0.5						
04/86		<0.5						

* = No purgeable halocarbons of interest detected during sampling.
TR = Trace (terminology used by USAF to quantify low levels of analytes).
NE = Not established.

(Continued)

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TABLE C-1. (Continued)

Monitoring Wells		TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
		Compounds (ug/L)						
Monitoring	DOHS Action Levels:	5	5	100	16	200	6	1
Wells	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
OTHER ON-BASE AREAS (Continued)								
BW-28 (Continued)								
05/86		<0.5		0.9				
06/86		<0.5		0.9				
07/86		<0.5		1.1				
08/86		<0.5						
09/86		<0.5(TR)						
10/86		<0.5(TR)						
11/86		<0.5(TR)						
12/86		<0.5(TR)		0.6				
01/87		<0.5		17.5				
02/87		<0.5(TR)						
03/87		<0.5(TR)						
04/87		TR		2.6				
05/87		TR		TR				
06/87		TR		1.7				
07/87		TR		TR		TR		
08/87 to 10/87		<0.5(TR)	TR					
11/87		<0.5			TR			
12/87		<0.5	TR		TR			
BW-29								
12/81*								
01/82*								
10/85		<0.5		1.3				
11/85		<0.5						

* = No purgeable halocarbons of interest detected during sampling.
TR = Trace (terminology used by USAF to quantify low levels of analytes).
NE = Not established.

(Continued)

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TABLE C-1. (Continued)

Monitoring Wells		Compounds (ug/L) TCE	Carbon Tetrachloride	Chloroform	1,2-DCE	1,1,1-TCA	1,1-DCE	1,2-DCA
Monitoring	DOHS Action Levels:	5	5	100	16	200	6	1
Wells	U.S. EPA PMCL:	5	5	100	NE	NE	7	5
OTHER ON-BASE AREAS (Continued)								
BW-29 (Continued)								
12/85		<0.5						
01/86		<0.5						
02/86		<0.5						
03/86		<0.5						
04/86		<0.5						
05/86		<0.5						
06/86		<0.5						
07/86		<0.5						
08/86		<0.5						
09/86		<0.5						
10/86		<0.5						
11/86		<0.5		0.6				
12/86		<0.5						
01/87		<0.5						
02/87		<0.5		0.6				
03/87		<0.5		0.5				
05/87		<0.5						
06/87		<0.5		1.2				
07/87		<0.5		2.4				
08/87		<0.5		TR				
09/87		<0.5		TR				

* = *No purgeable halocarbons of interest detected during sampling.*

TR = Trace (terminology used by USAF to quantify low levels of analytes).

NE = Not established.

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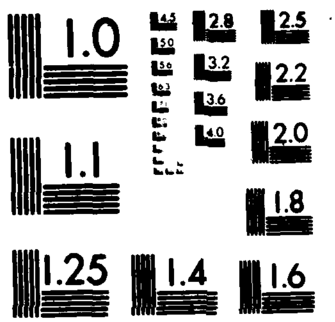
AD-A198 861 INSTALLATION RESTORATION PROGRAM STAGE 3 MCCLELLAN AIR FORCE BASE(U) RADIAN CORP SACRAMENTO CA SEP 88 F33615-87-D 4023 4/4

UNCLASSIFIED F/G 24/4 NL

END
DATE
FILMED
11 88

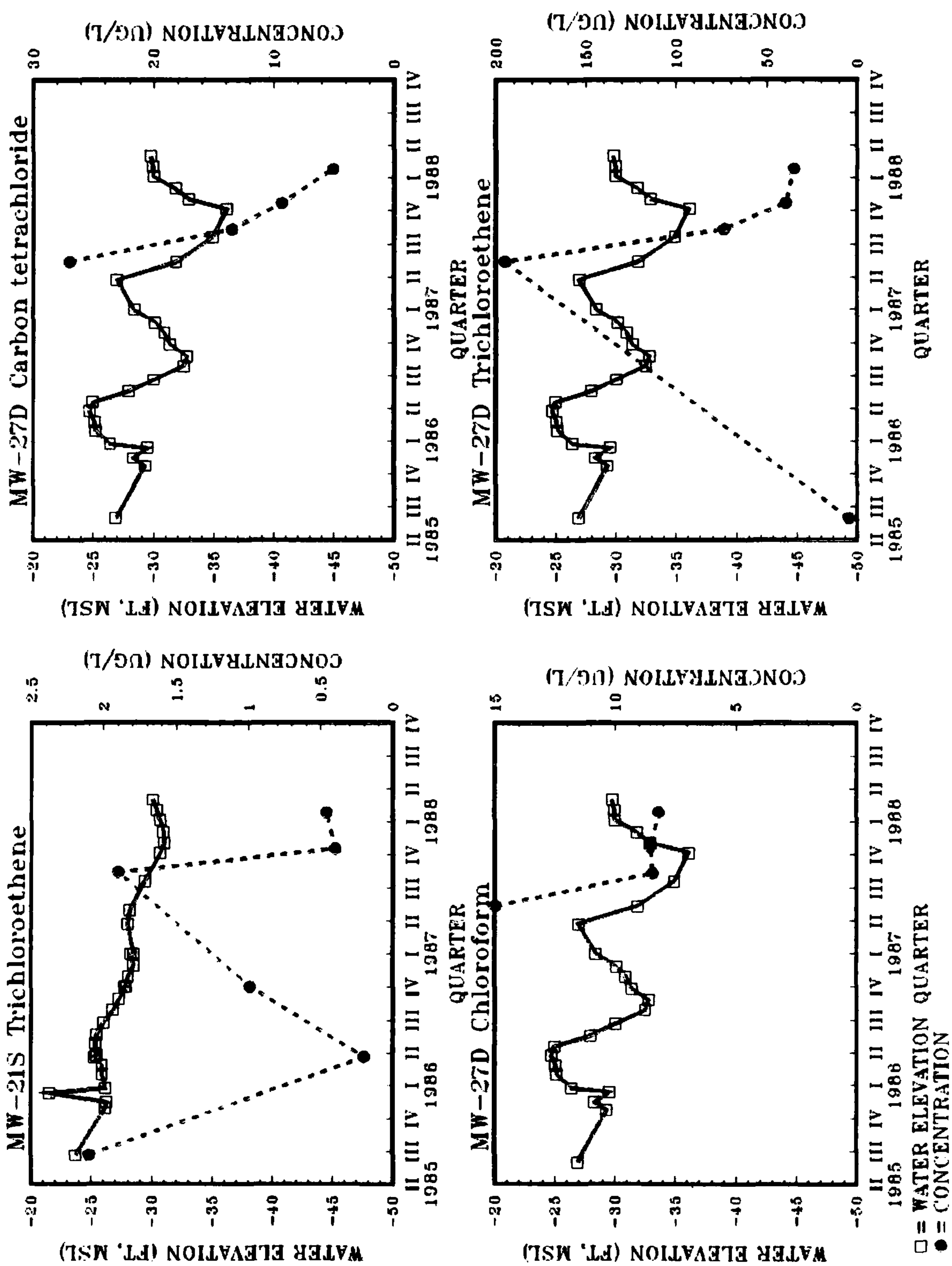


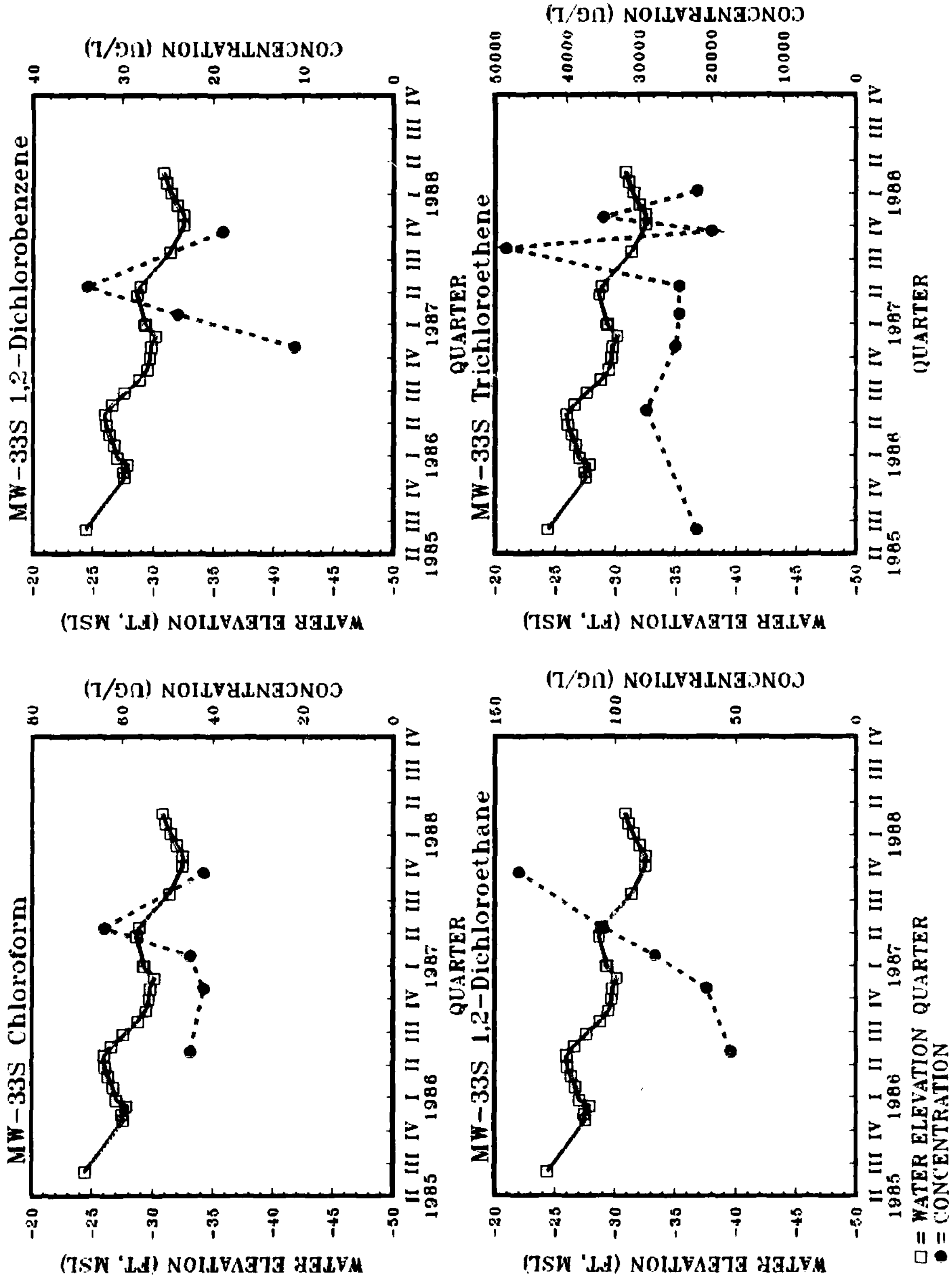
MICROCOPY

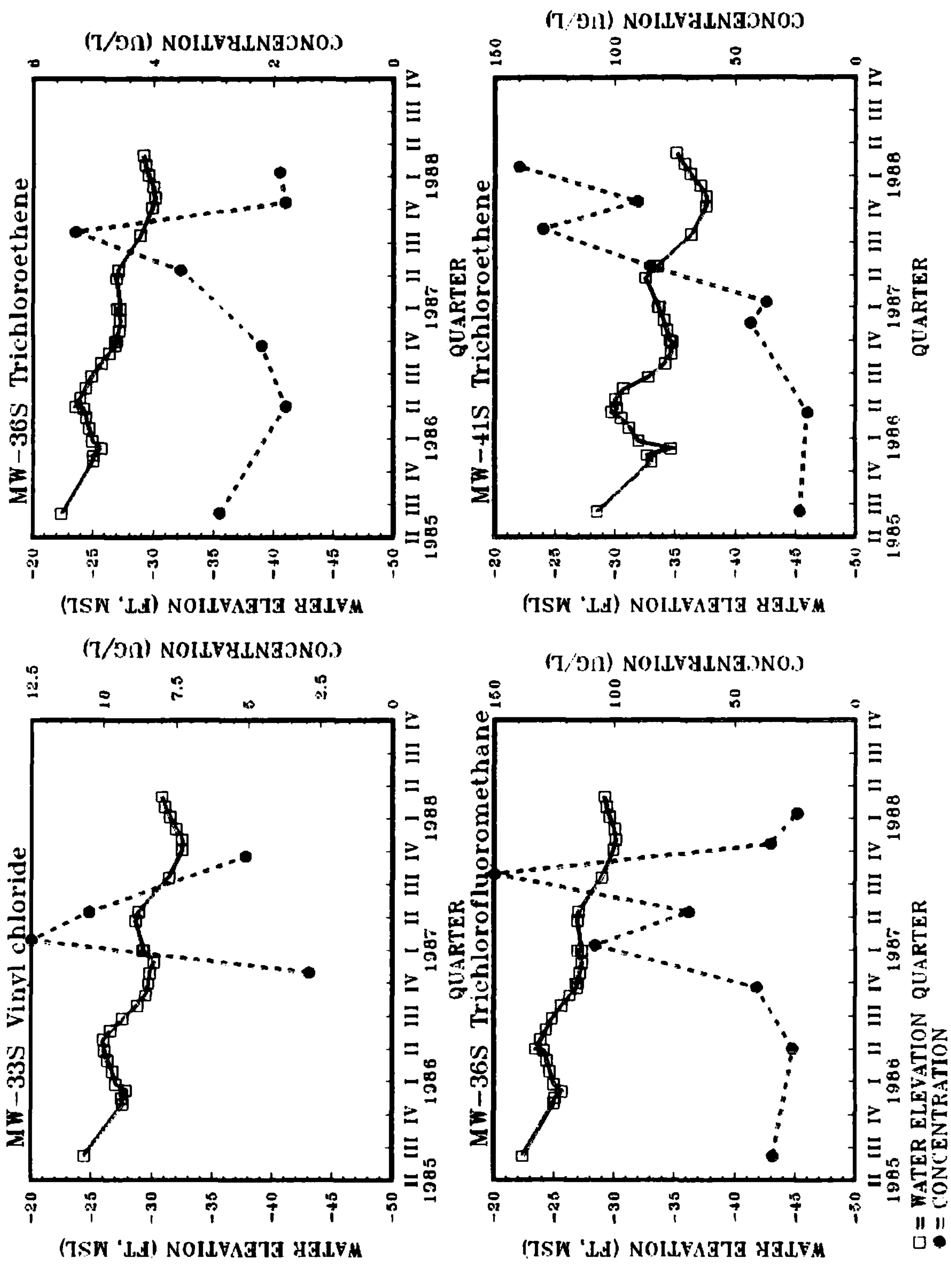
RADIAN CORPORATION

APPENDIX D

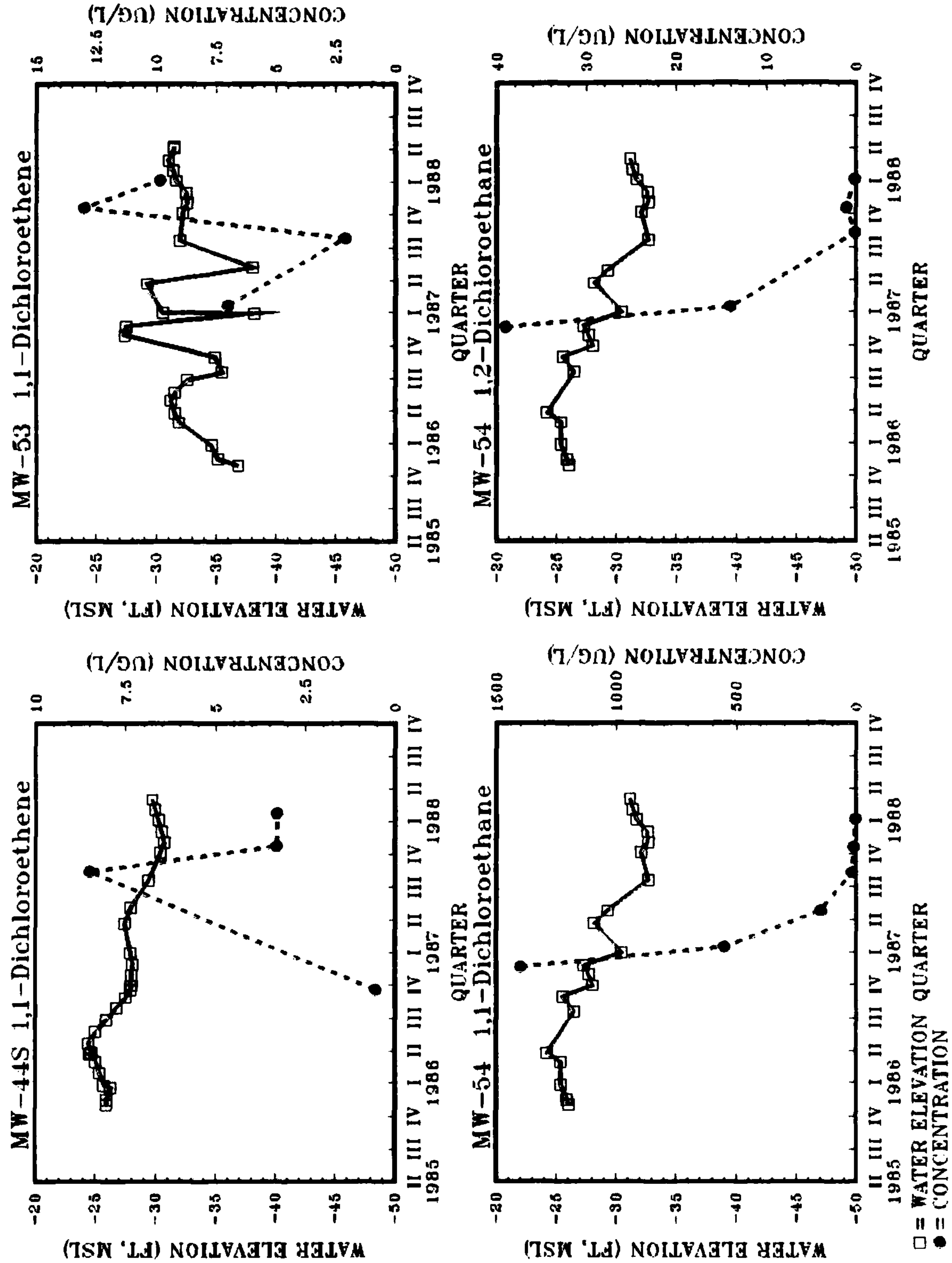
Time Series Plots of Contaminant
Concentrations Versus Water Levels

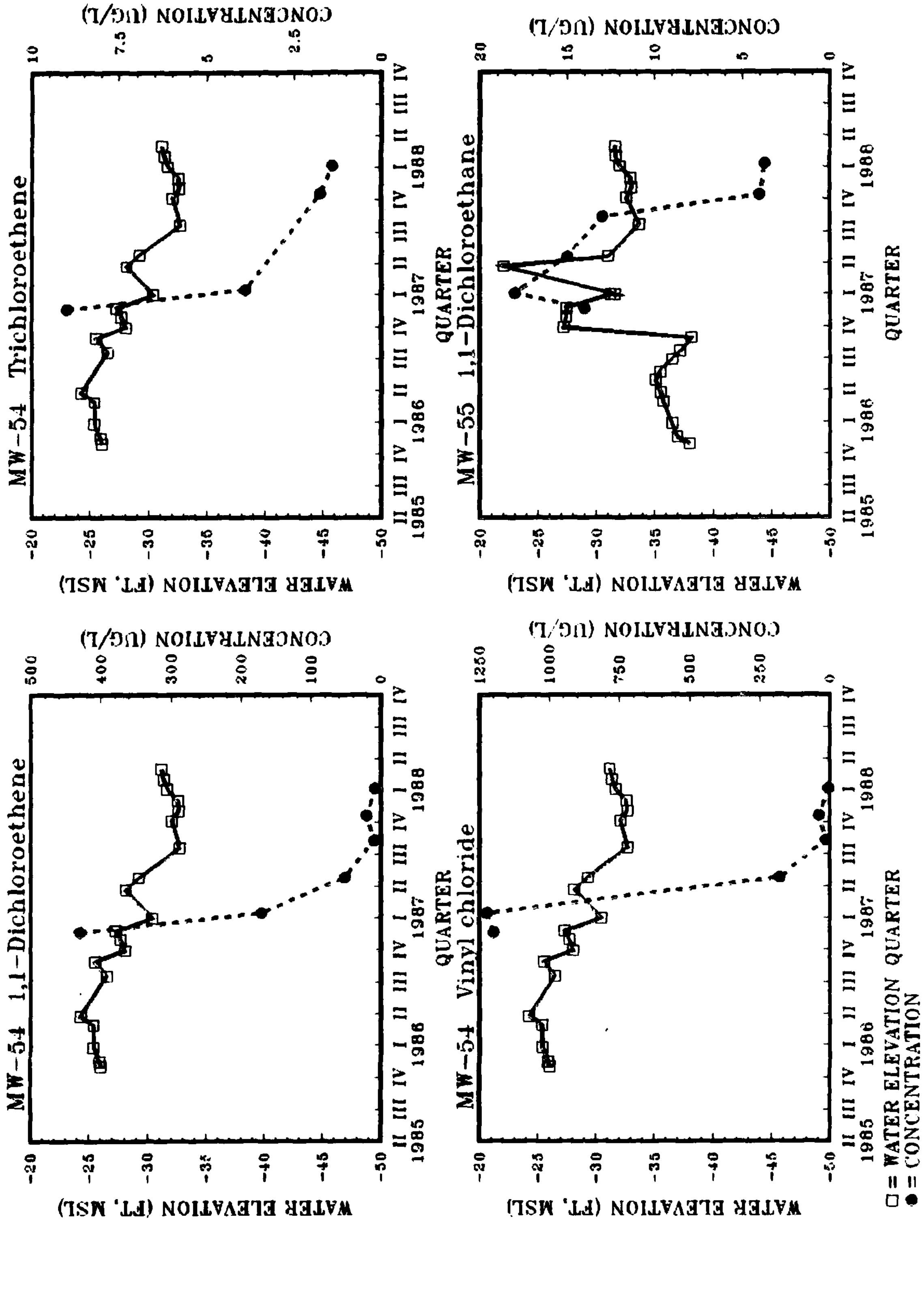

MW-27D Carbon tetrachloride
MW-27D Trichloroethene
MW-21S Trichloroethene
MW-27D Chloroform
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
□ = WATER ELEVATION
● = CONCENTRATION

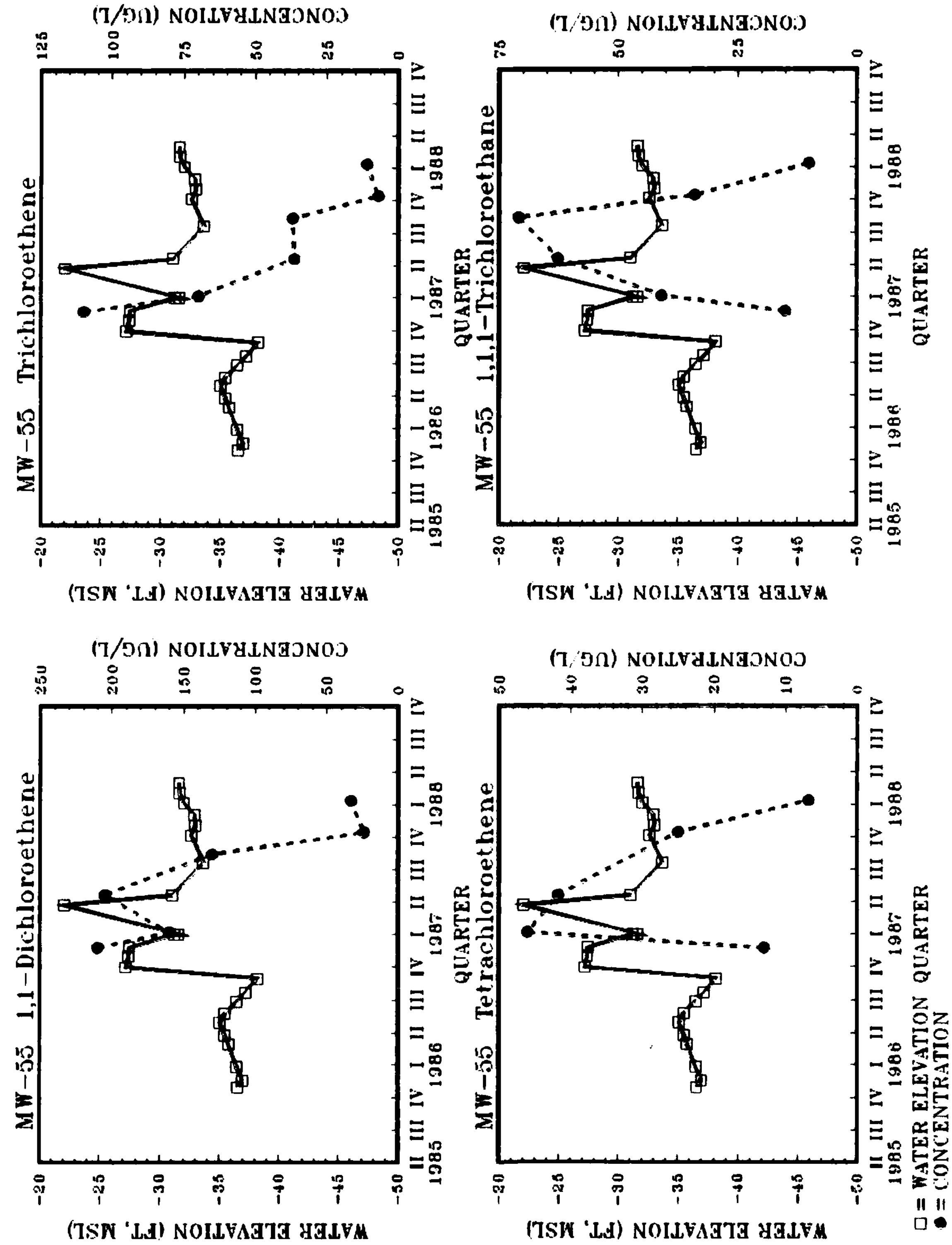

MW-33S 1,2-Dichlorobenzene
MW-33S Trichloroethene
MW-33S Chloroform
MW-33S 1,2-Dichloroethane
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
□ = WATER ELEVATION
● = CONCENTRATION

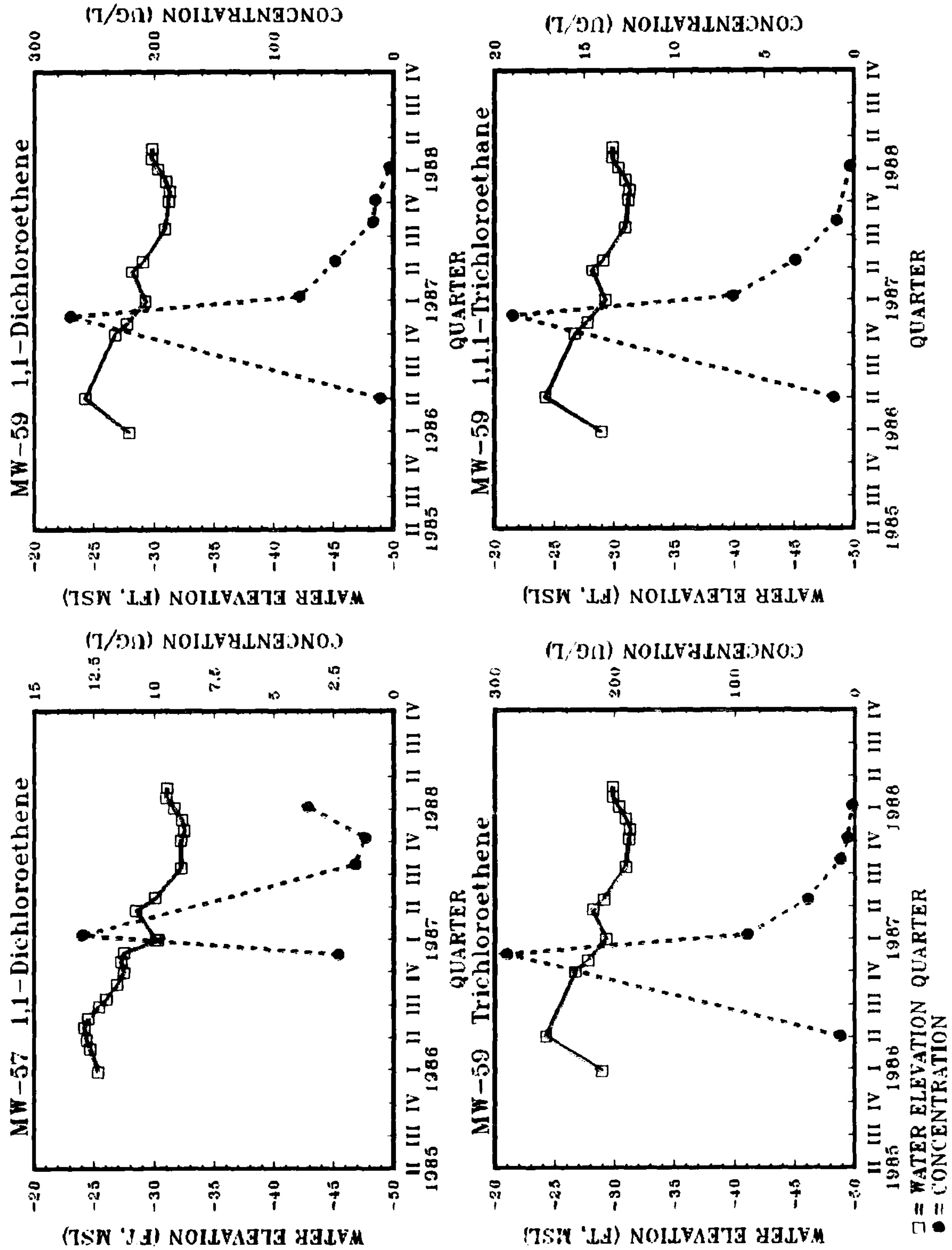

MW-36S Trichloroethene
MW-41S Trichloroethene
MW-33S Vinyl chloride
MW-36S Trichlorofluoromethane
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
II III IV I II III IV I II III IV I II III IV
1985 1986 1987 1988
□ = WATER ELEVATION
● = CONCENTRATION

RADIAN
CORPORATION

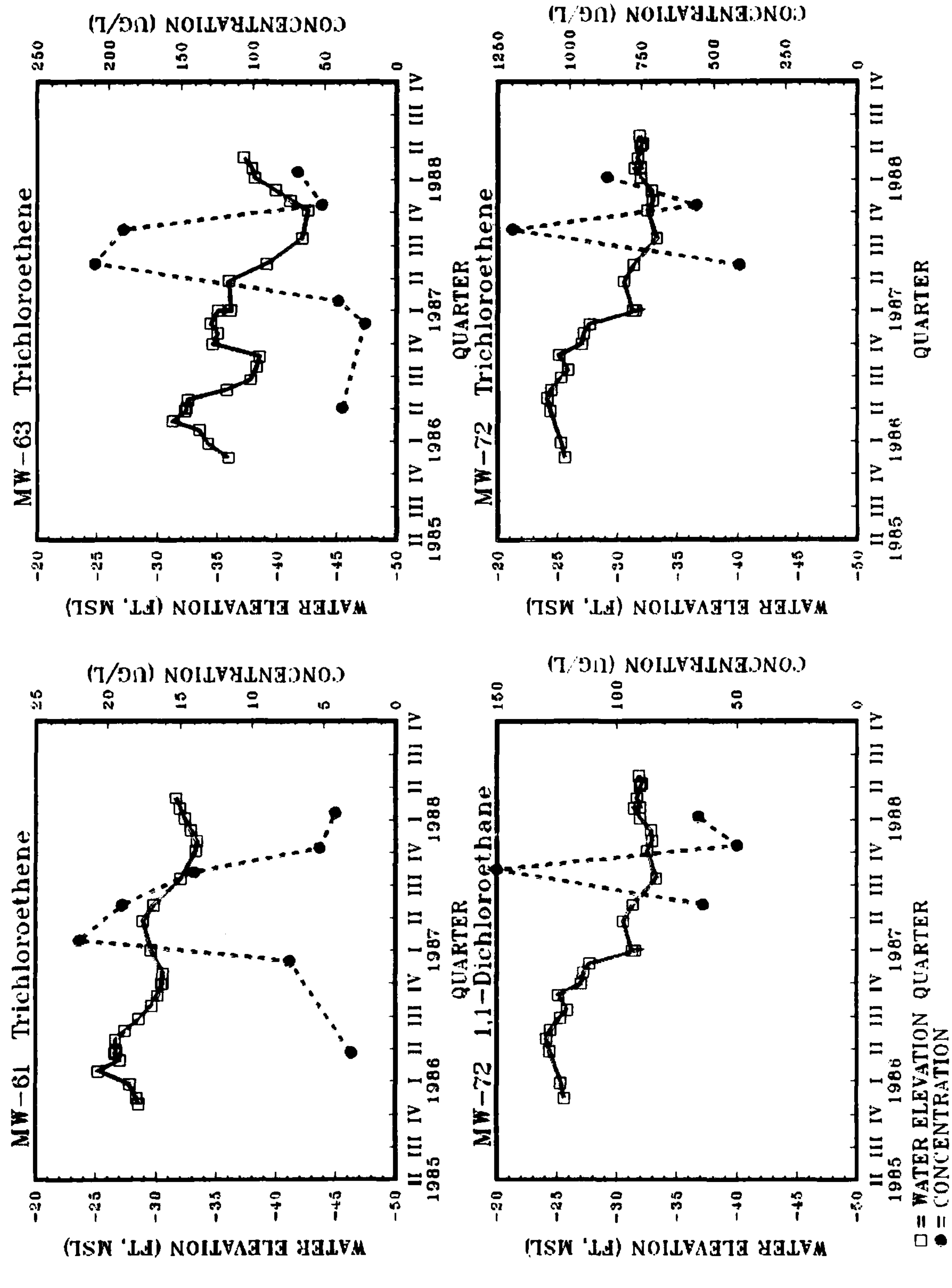



MW-54 Trichloroethene
MW-55 1,1-Dichloroethane
MW-54 1,1-Dichloroethene
MW-54 Vinyl chloride
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
□ = WATER ELEVATION
● = CONCENTRATION

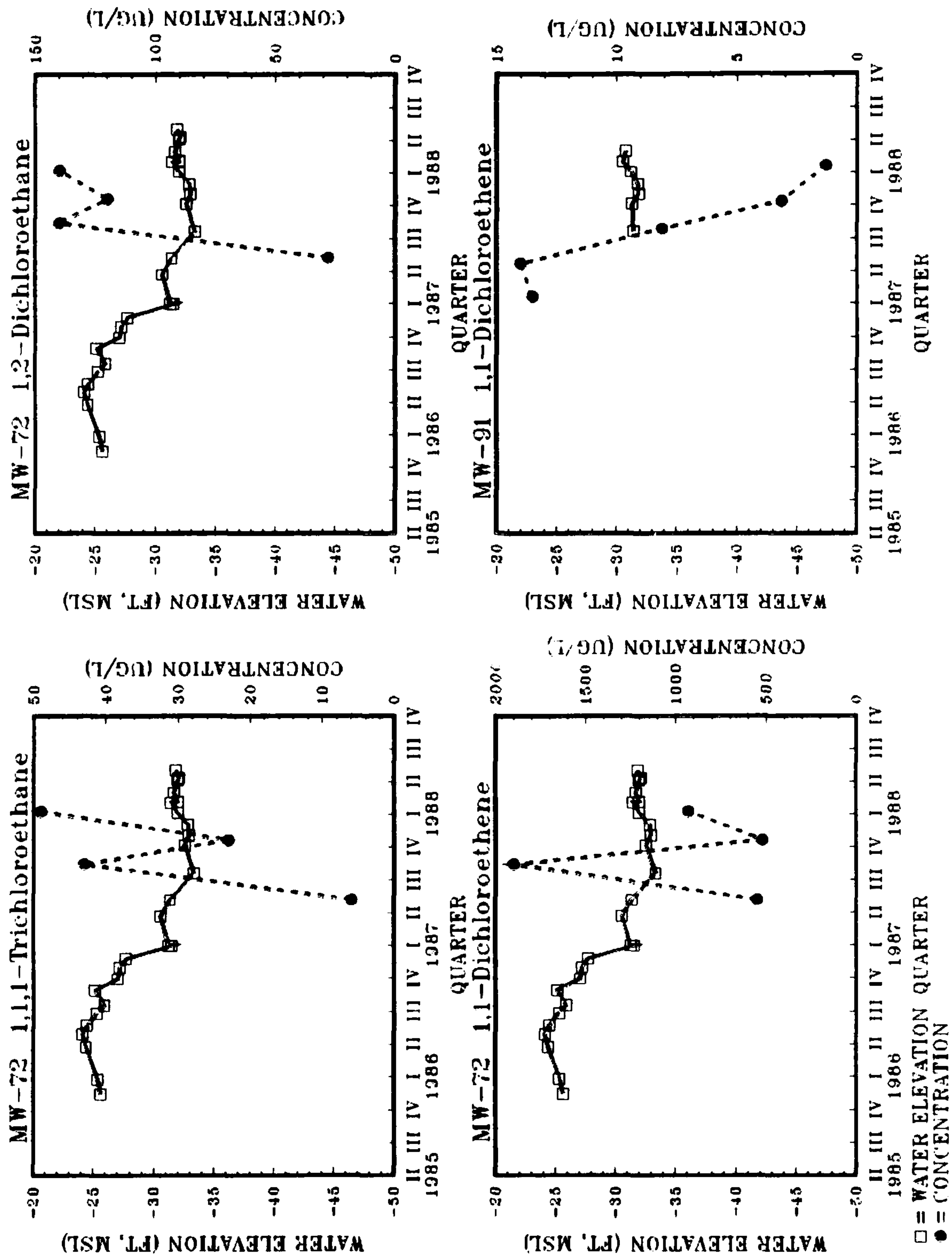

MW-55 Trichloroethene
MW-55 1,1,1-Trichloroethane
MW-55 1,1-Dichloroethene
MW-55 Tetrachloroethene
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
II III IV I II III IV I II III IV I II III IV
1985 1986 1987 1988
□ = WATER ELEVATION
● = CONCENTRATION

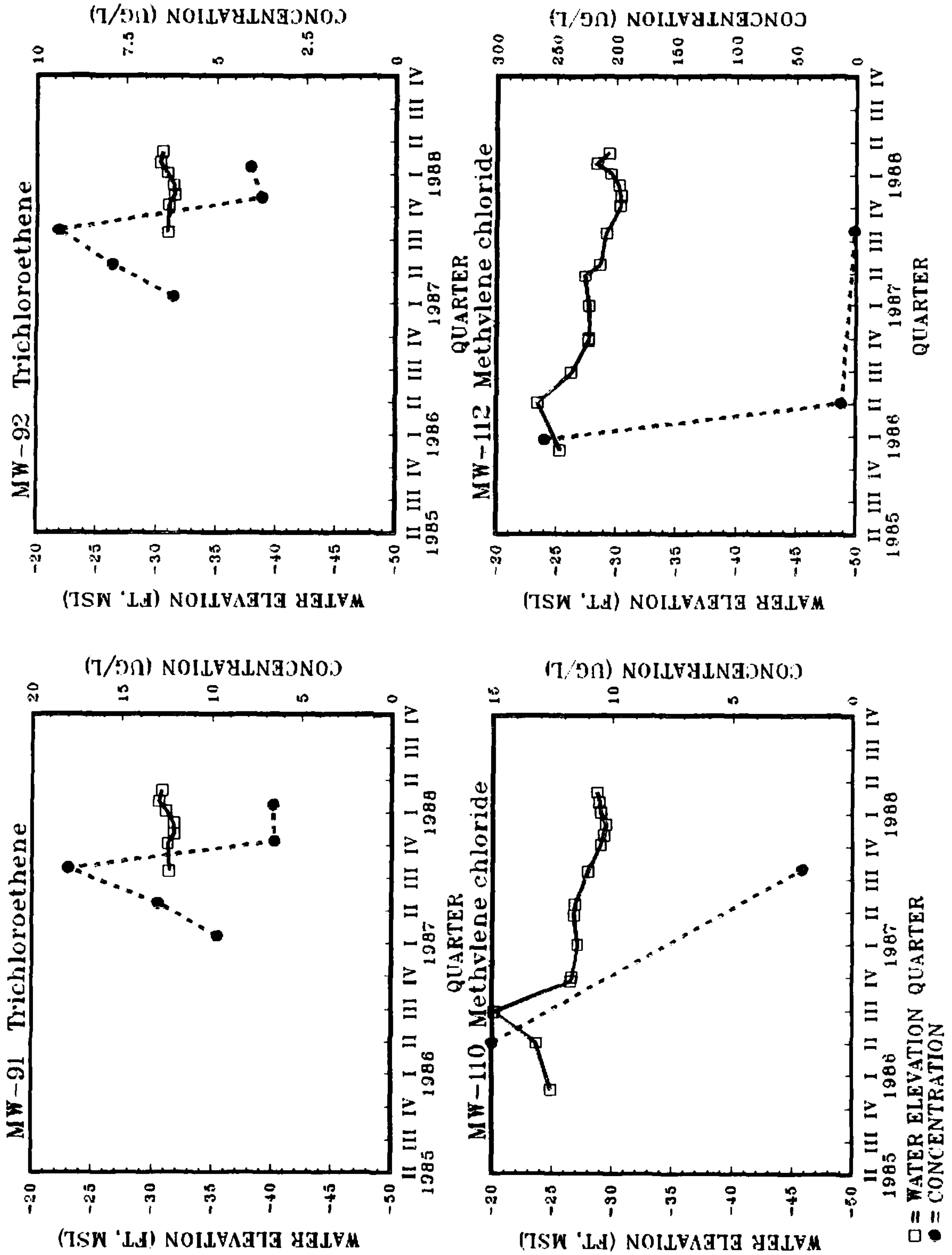

MW-59 1,1-Dichloroethene
MW-59 1,1,1-Trichloroethane
MW-57 1,1-Dichloroethene
MW-59 Trichloroethene
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
II III IV I II III IV I II III IV I II III IV
1985 1986 1987 1988
□ = WATER ELEVATION
● = CONCENTRATION

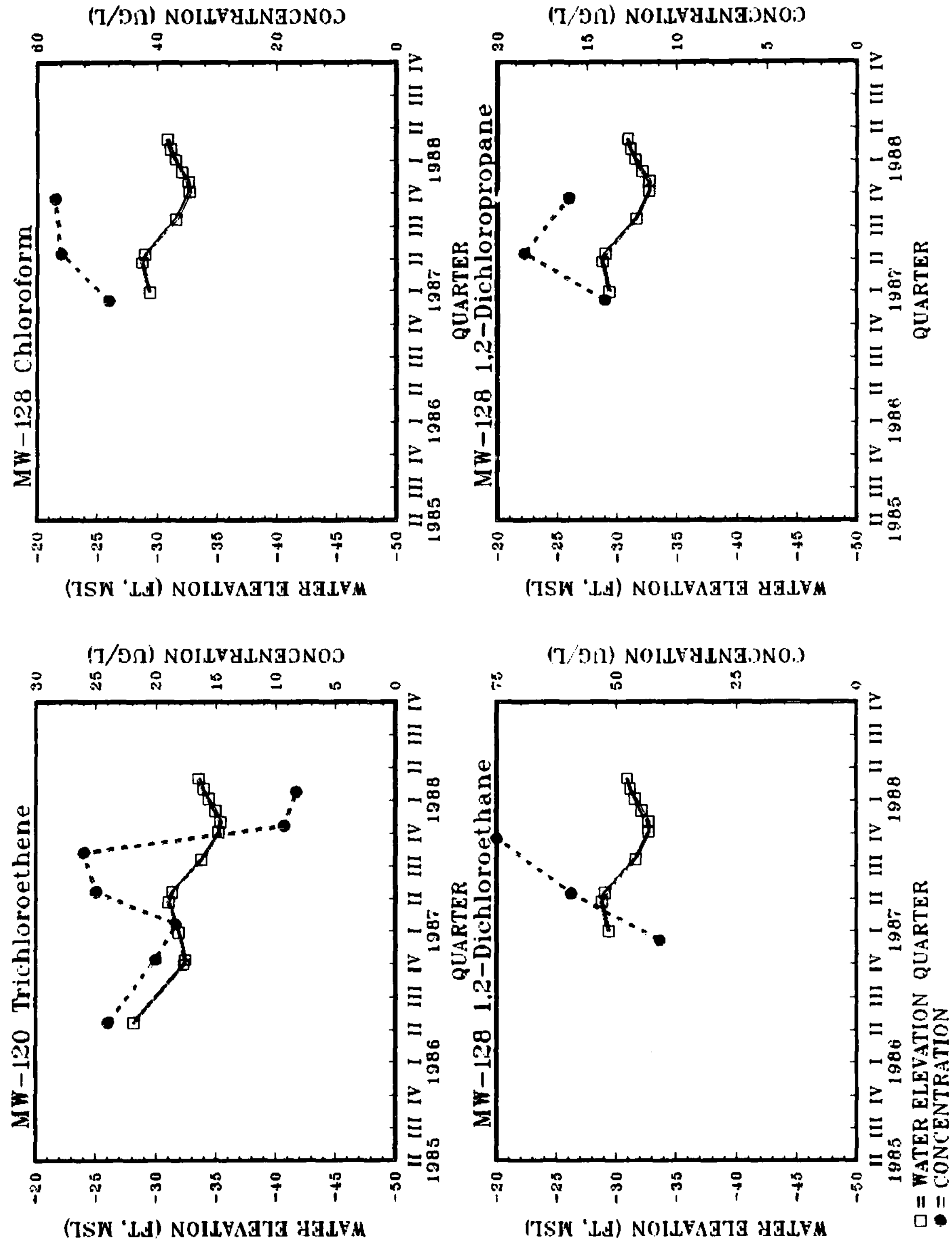
RADIAN
CORPORATION

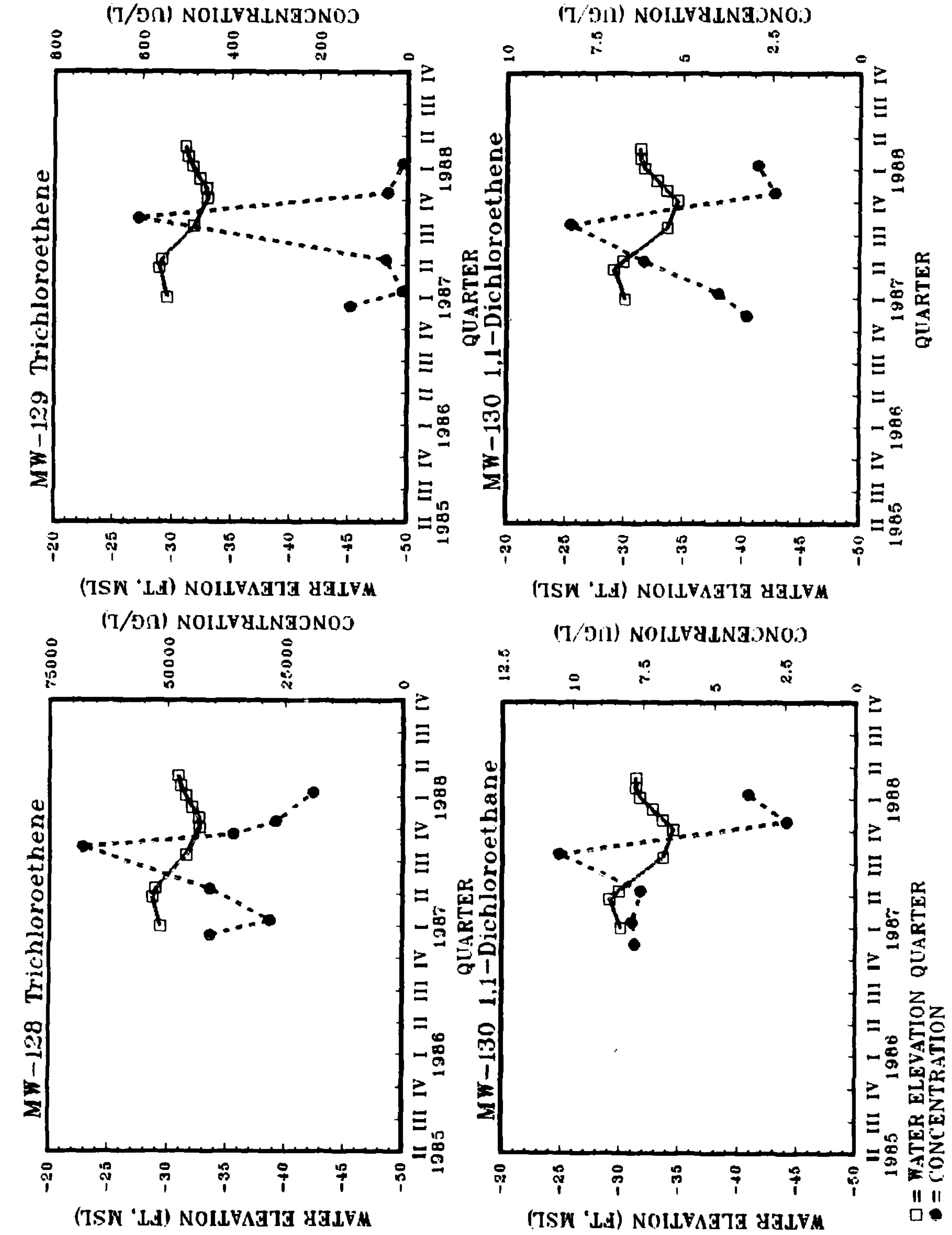


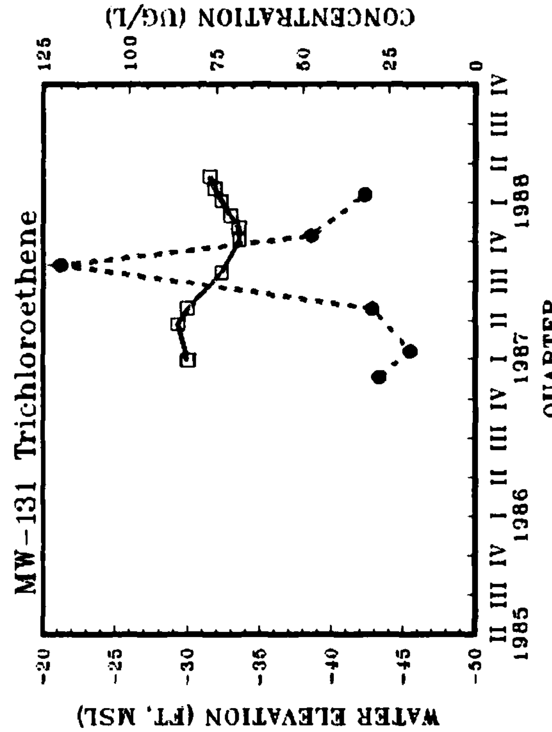
RADIAN
CORPORATION

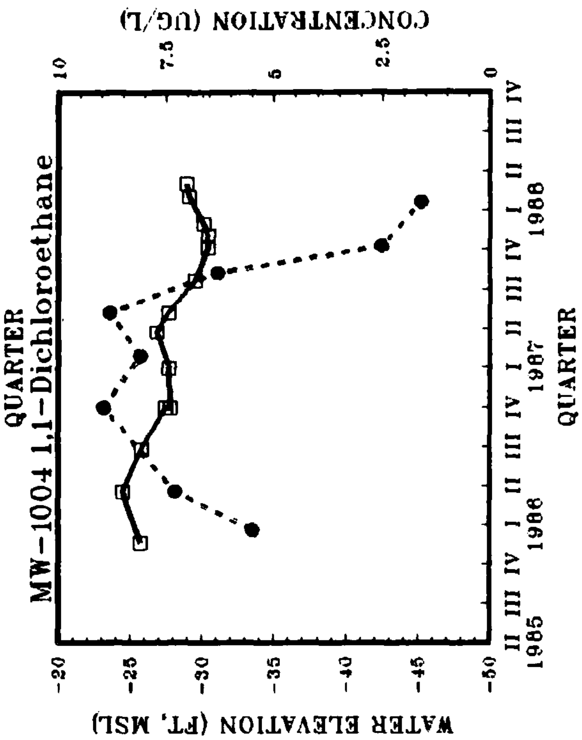


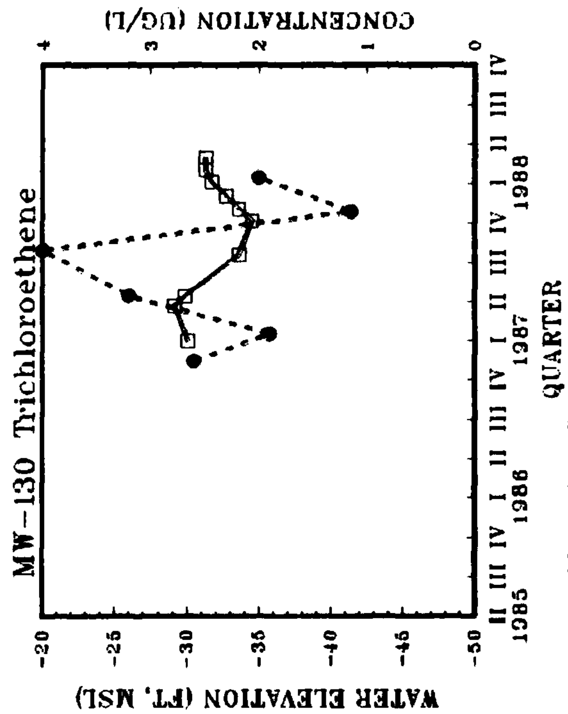

MW-92 Trichloroethene
MW-112 Methylene chloride
MW-91 Trichloroethene
MW-110 Methylene chloride
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
□ = WATER ELEVATION
● = CONCENTRATION

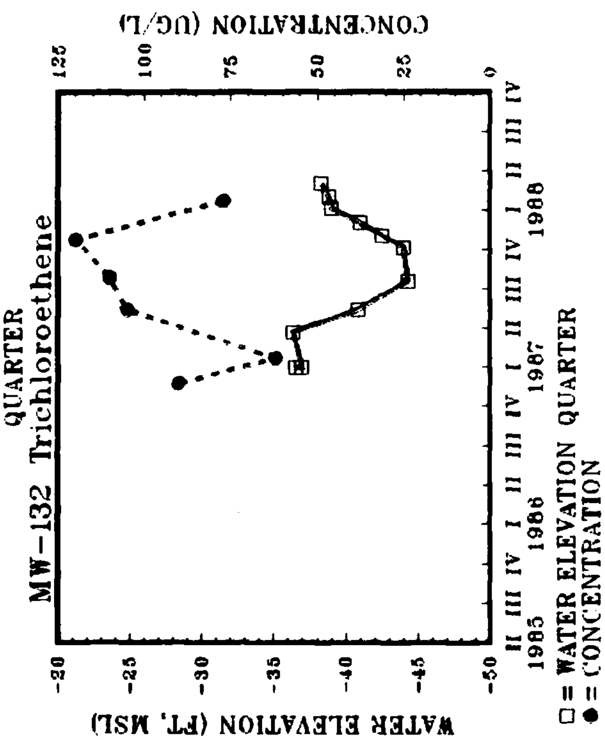

MW-128 Chloroform
MW-128 1,2-Dichloropropane
MW-120 Trichloroethene
MW-128 1,2-Dichloroethane
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
□ = WATER ELEVATION
● = CONCENTRATION


MW-129 Trichloroethene
MW-130 1,1-Dichloroethene
MW-128 Trichloroethene
MW-130 1,1-Dichloroethane
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
II III IV I II III IV I II III IV I II III IV
1985 1986 1987 1988
-20 -25 -30 -35 -40 -45 -50
800 600 400 200 0
10 7.5 5 2.5 0
75000 50000 25000 0
12.5 10 7.5 5 2.5 0
□ = WATER ELEVATION
● = CONCENTRATION

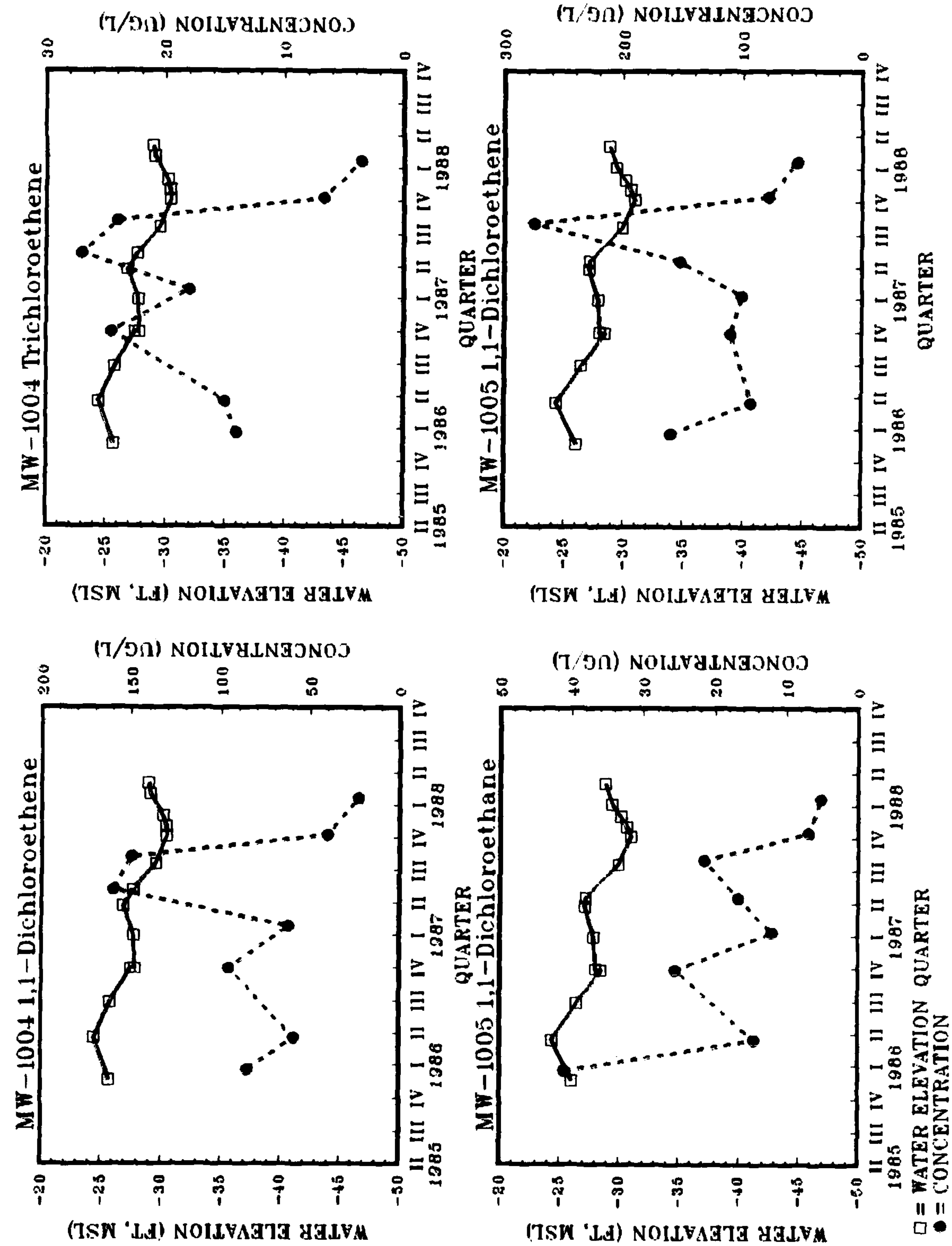

MW-131 Trichloroethene
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
1985 1986 1987 1988


MW-1004 1,1-Dichloroethane
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
1985 1986 1987 1988

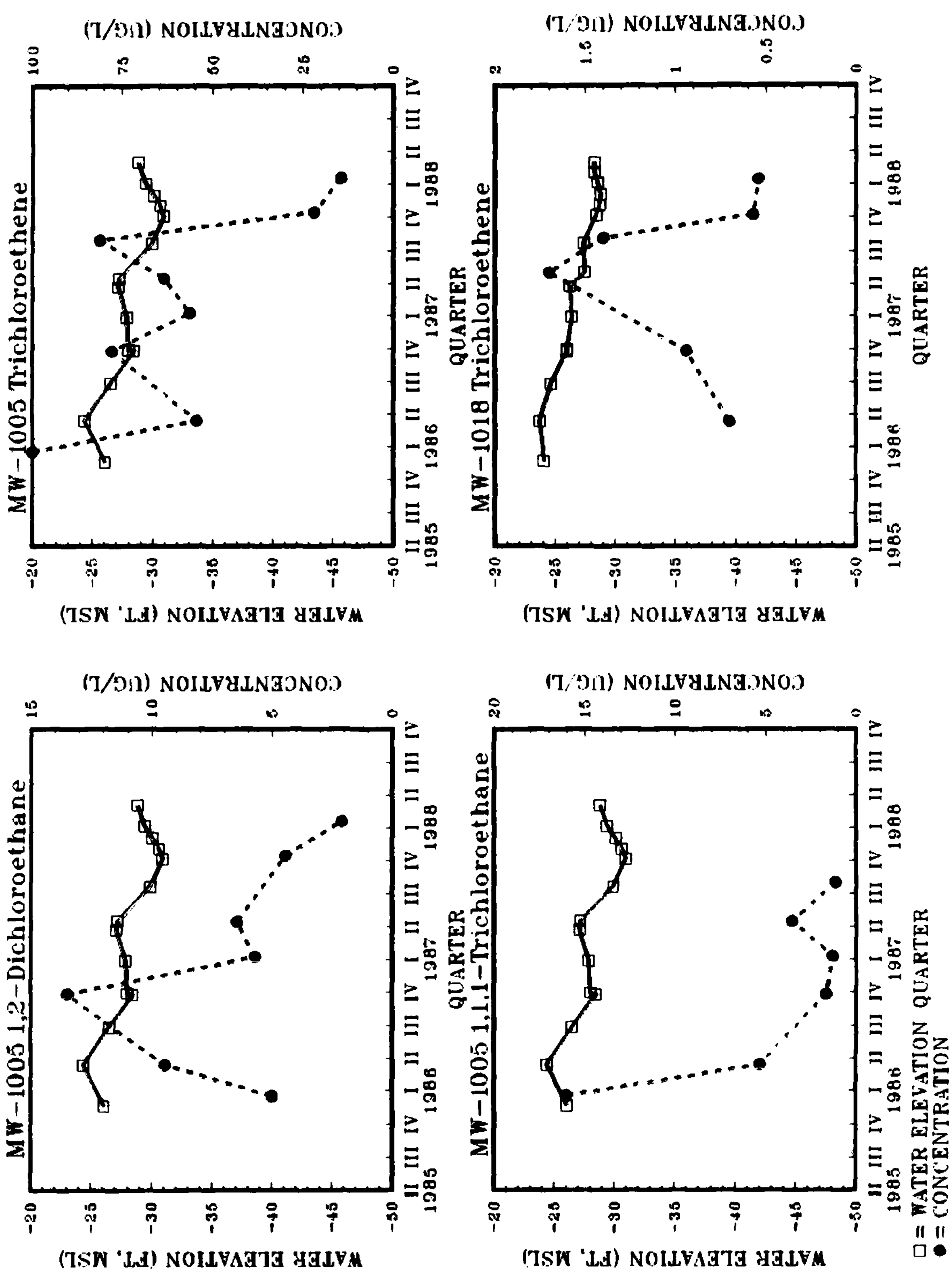

MW-130 Trichloroethene
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
1985 1986 1987 1988


MW-132 Trichloroethene
WATER ELEVATION (FT, MSL)
CONCENTRATION (UG/L)
QUARTER
1985 1986 1987 1988
□ = WATER ELEVATION
● = CONCENTRATION

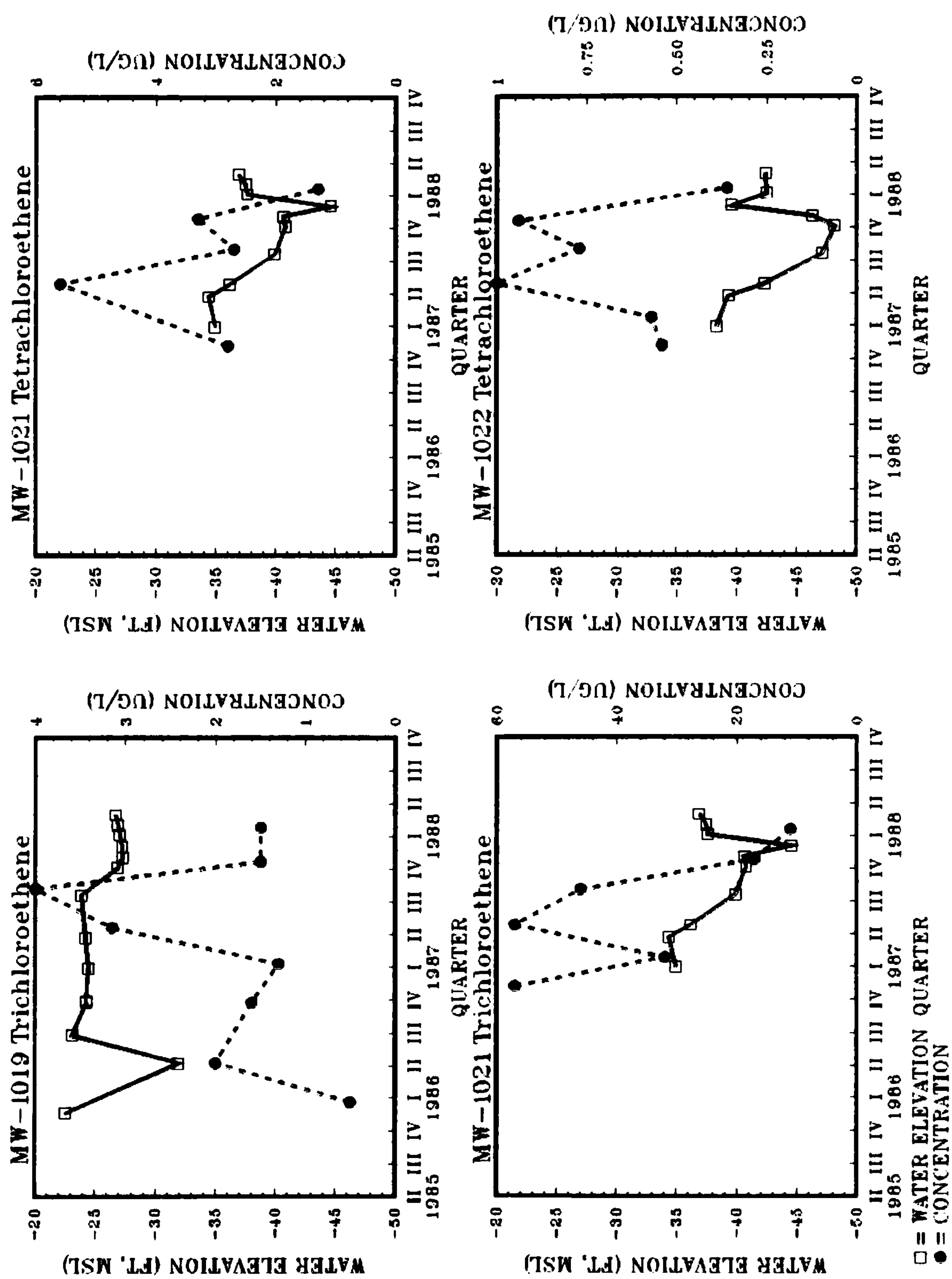
RADIAN
CORPORATION

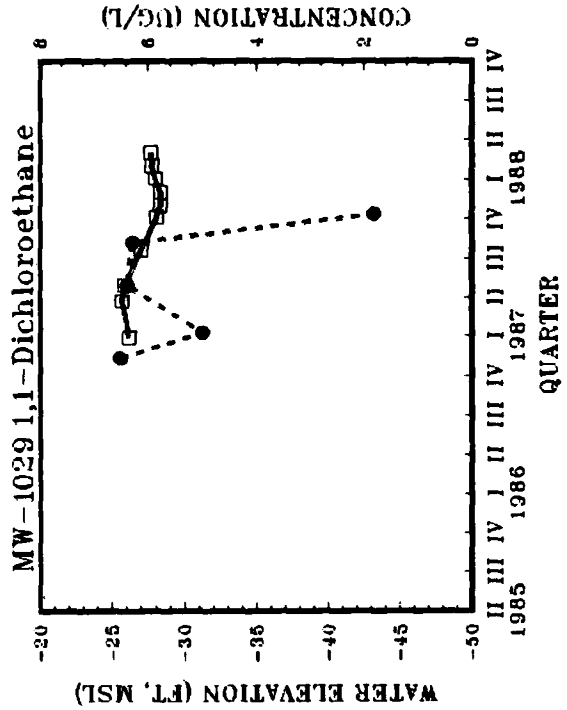


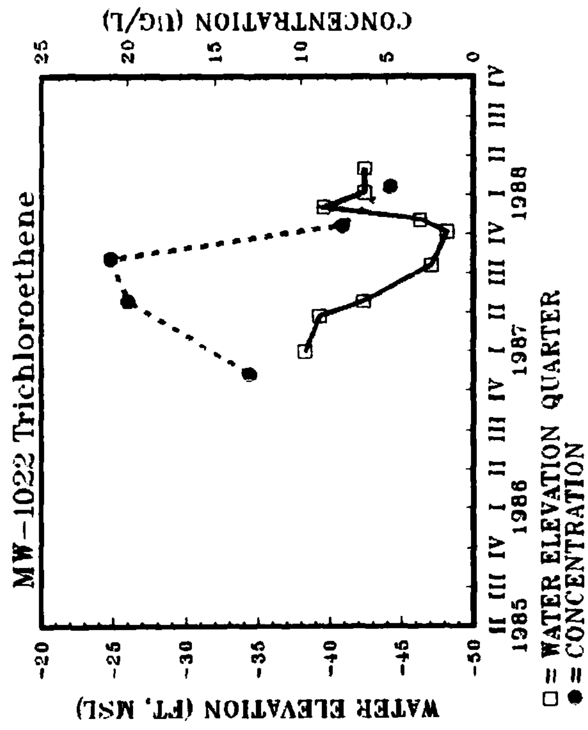
RADIAN
CORPORATION

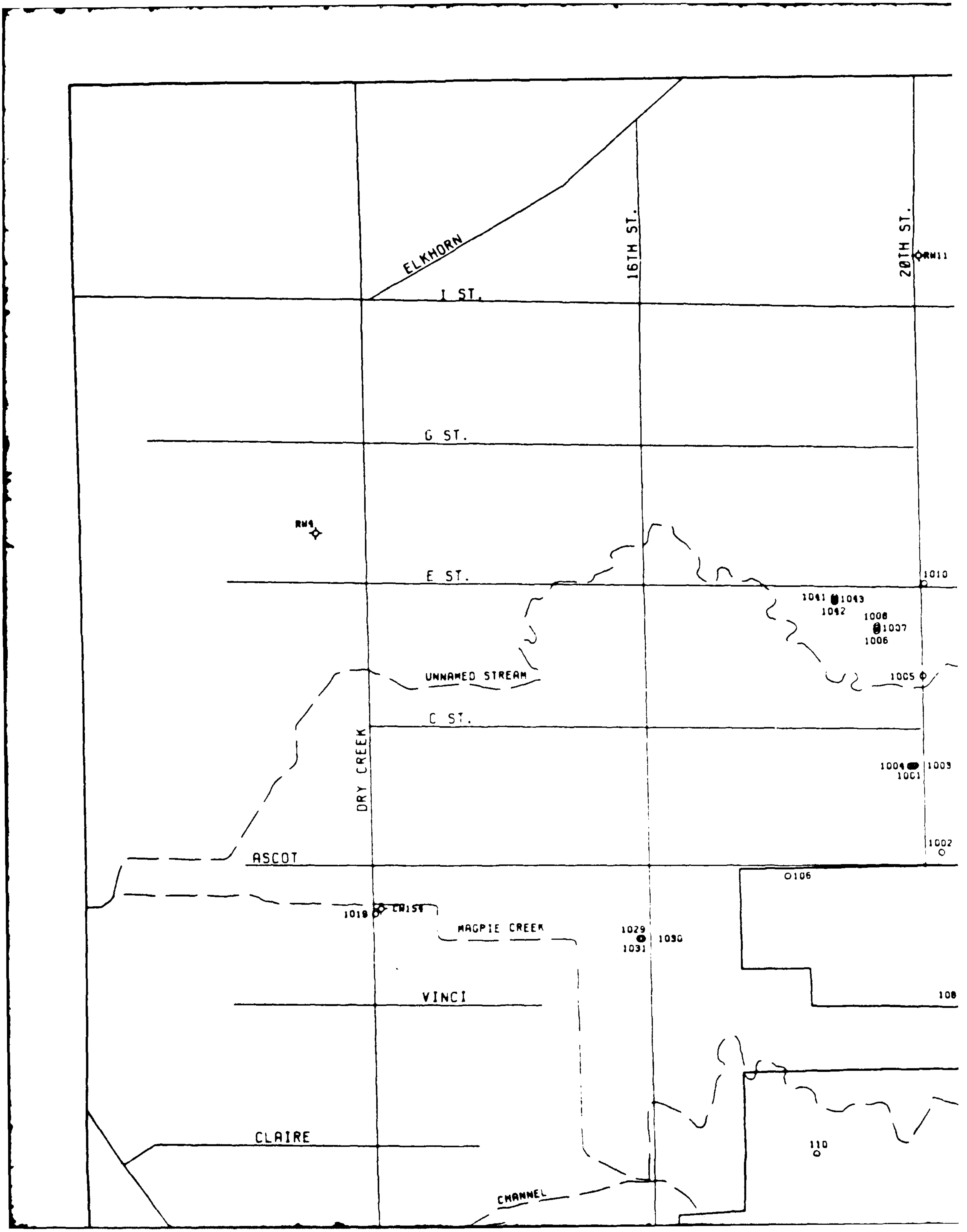


RADIAN
CORPORATION

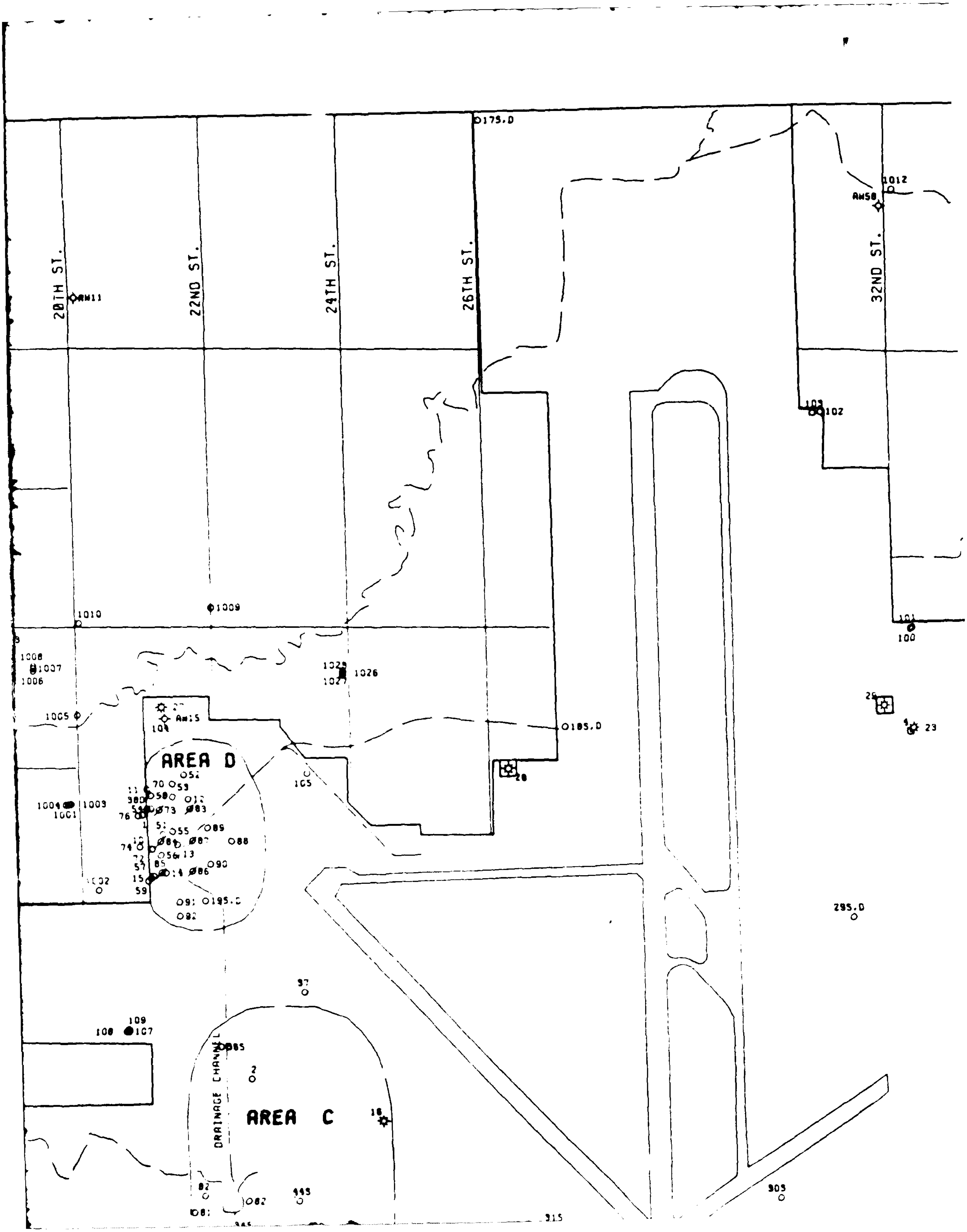



MW-1029 1,1-Dichloroethane
WATER ELEVATION (FT, MSL)
-20
-25
-30
-35
-40
-45
-50
CONCENTRATION (UG/L)
8
6
4
2
0
II III IV I II III IV I II III IV I II III IV
1985 1986 1987 1988
QUARTER

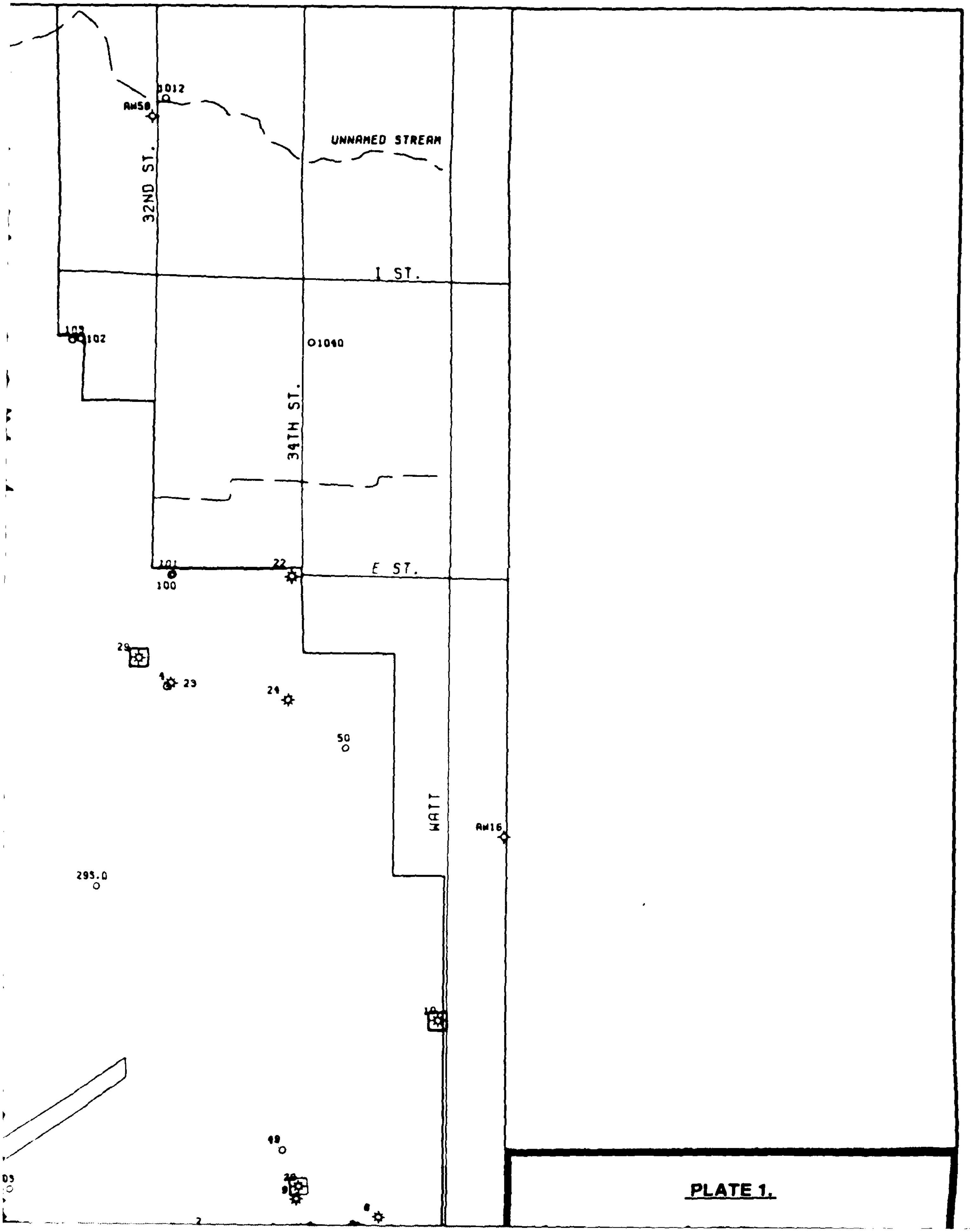

MW-1022 Trichloroethene
WATER ELEVATION (FT, MSL)
-20
-25
-30
-35
-40
-45
-50
CONCENTRATION (UG/L)
25
20
15
10
5
0
II III IV I II III IV I II III IV I II III IV
1985 1986 1987 1988
QUARTER
□ = WATER ELEVATION
● = CONCENTRATION



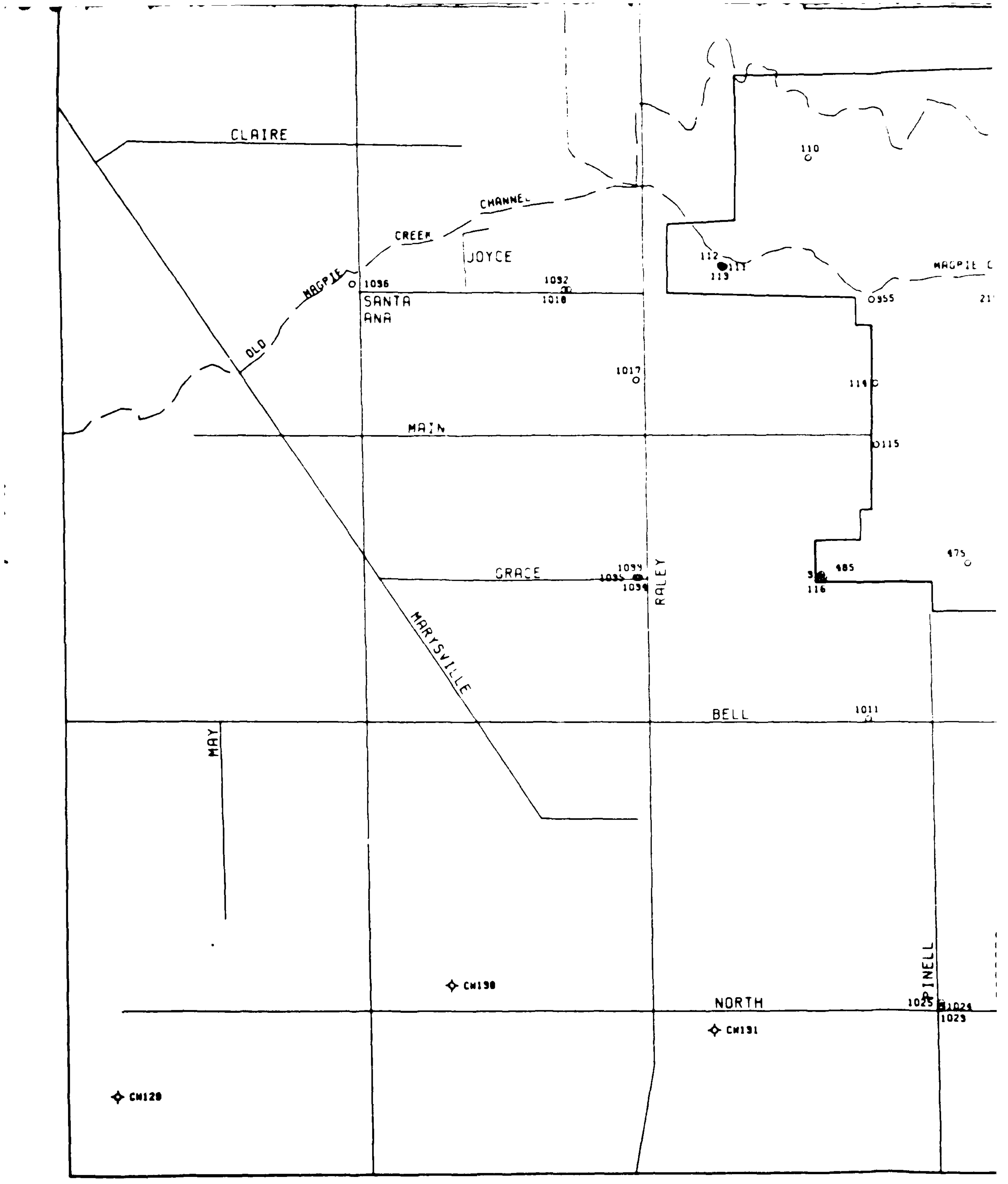
ELKHORN
16TH ST.
20TH ST.
RW11
I ST.
G ST.
RW4
E ST.
1010
1041
1043
1042
1008
1007
1006
UNNAMED STREAM
1005
C ST.
DRY CREEK
1004
1003
1001
1002
ASCOT
0106
1019
CW15
MAGPIE CREEK
1029
1030
1031
VINCI
108
CLAIRE
110
CHANNEL



20TH ST.
22ND ST.
24TH ST.
26TH ST.
32ND ST.
AREA D
AREA C
DRAINAGE CHANNEL
175.D
185.D
195.D
295.D
AW11
AW15
AW58
1012
1010
1009
1005
1026
1003
1002
102
100
23
28
109
108
107
305
315



1012
AW58
UNNAMED STREAM
32ND ST.
I ST.
102
1040
34TH ST.
101
100
22
E ST.
29
23
24
50
WATT
AW16
295.0
48
PLATE 1.


CLAIRE
CHANNEL
CREEK
JOYCE
MAGPIE
OLD
1036
SANTA
ANA
1032
1018
110
112
111
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MAGPIE C
0355
1017
114
MAIN
115
GRACE
1034
1035
1039
RALEY
485
475
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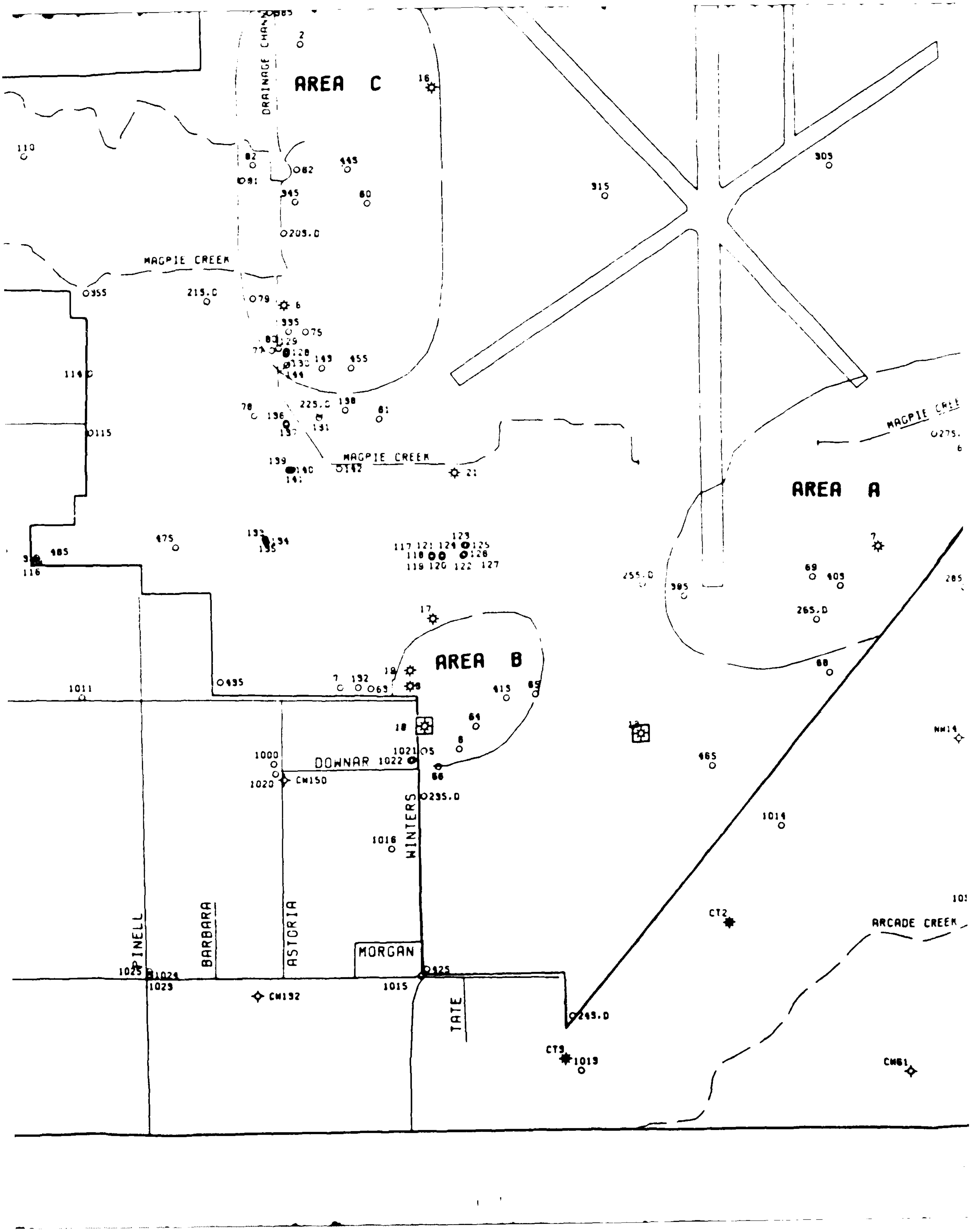
MARYSVILLE
BELL
1011
MAY
CW130
NORTH
PINELL
1025
1024
1023
CW131
CW129



AREA C
DRAINAGE CHAN
MAGPIE CREEK
MAGPIE CREEK
MAGPIE CREEK
AREA A
AREA B
DOWNAR
WINTERS
PINELL
BARBARA
ASTORIA
MORGAN
TATE
ARCADE CREEK
CW150
CW132
CT2
CT3
CW61

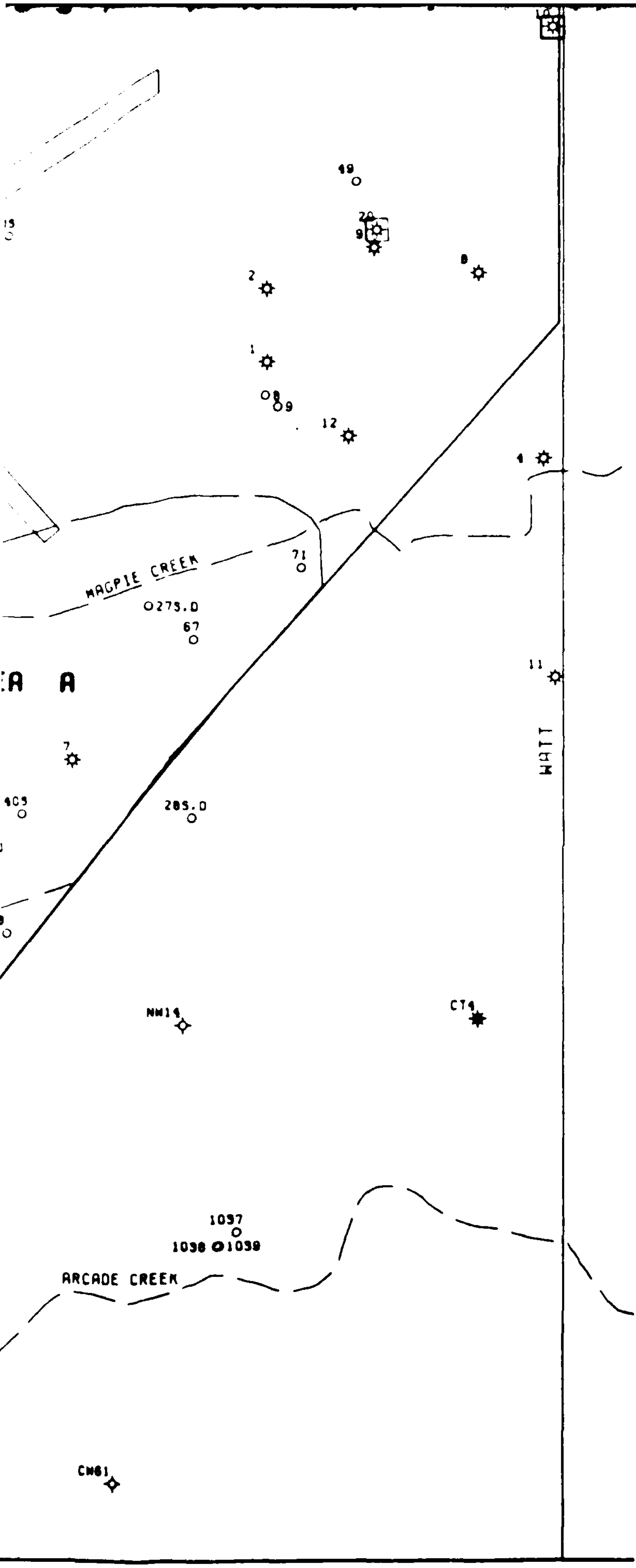


PLATE 1.

WELL LOCATION MAP

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

- McCLELLAN AFB BOUNDARY
- STREAMS
- AREA — BOUNDARIES OF PAST DISPOSAL/ STORAGE SITES
- MONITORING WELL
- EXTRACTION WELL

BASE PRODUCTION WELLS

- ACTIVE WATER SUPPLY WELL
- INACTIVE AT PRESENT

MUNICIPAL WATER SUPPLY WELLS

CW	CITY OF SACRAMENTO
NW	NORTHRIDGE WATER DISTRICT
RW	RIO LINDA WATER DISTRICT
AW	ARCADE WATER DISTRICT

IRRIGATION WELLS

CT	CALTRANS

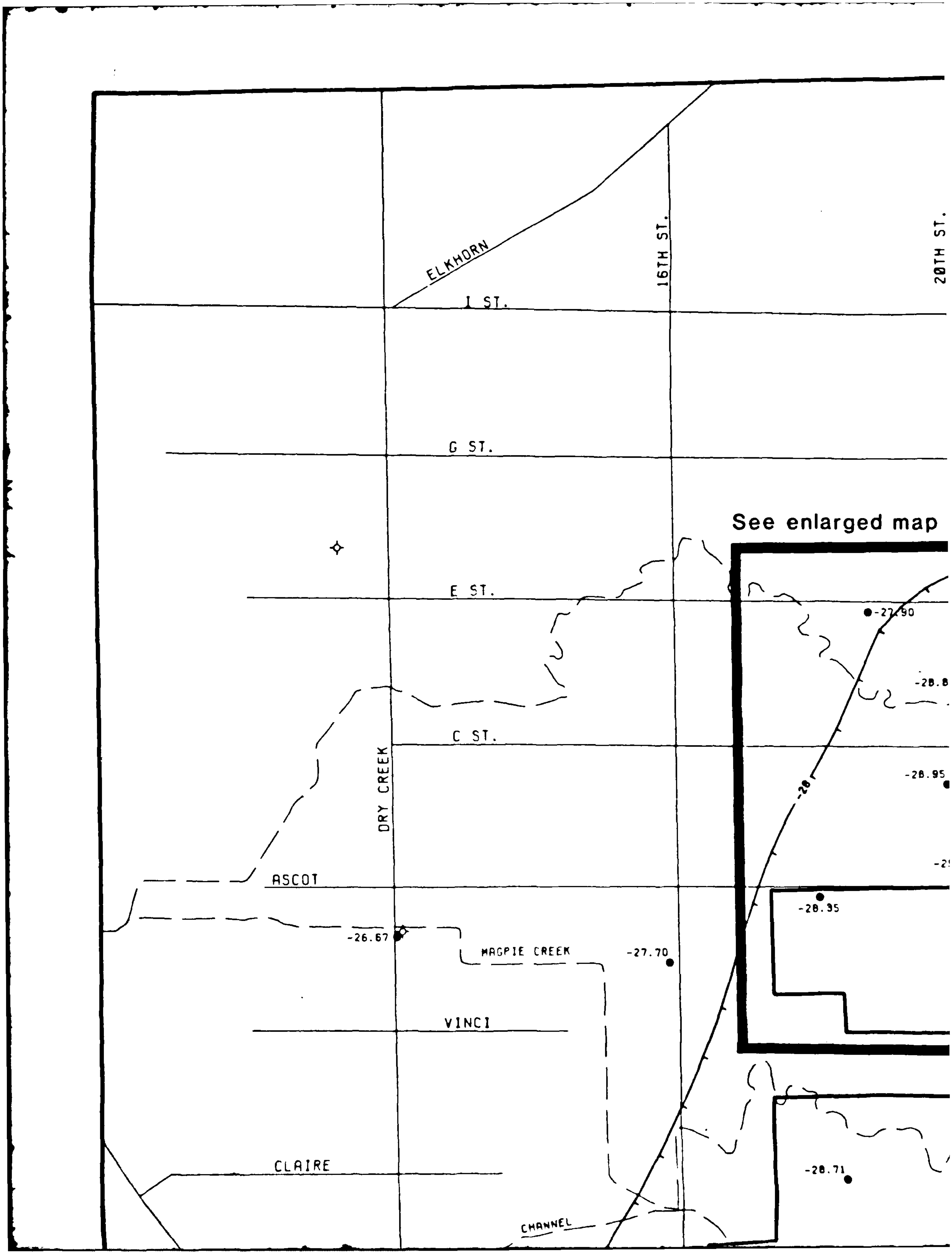
N

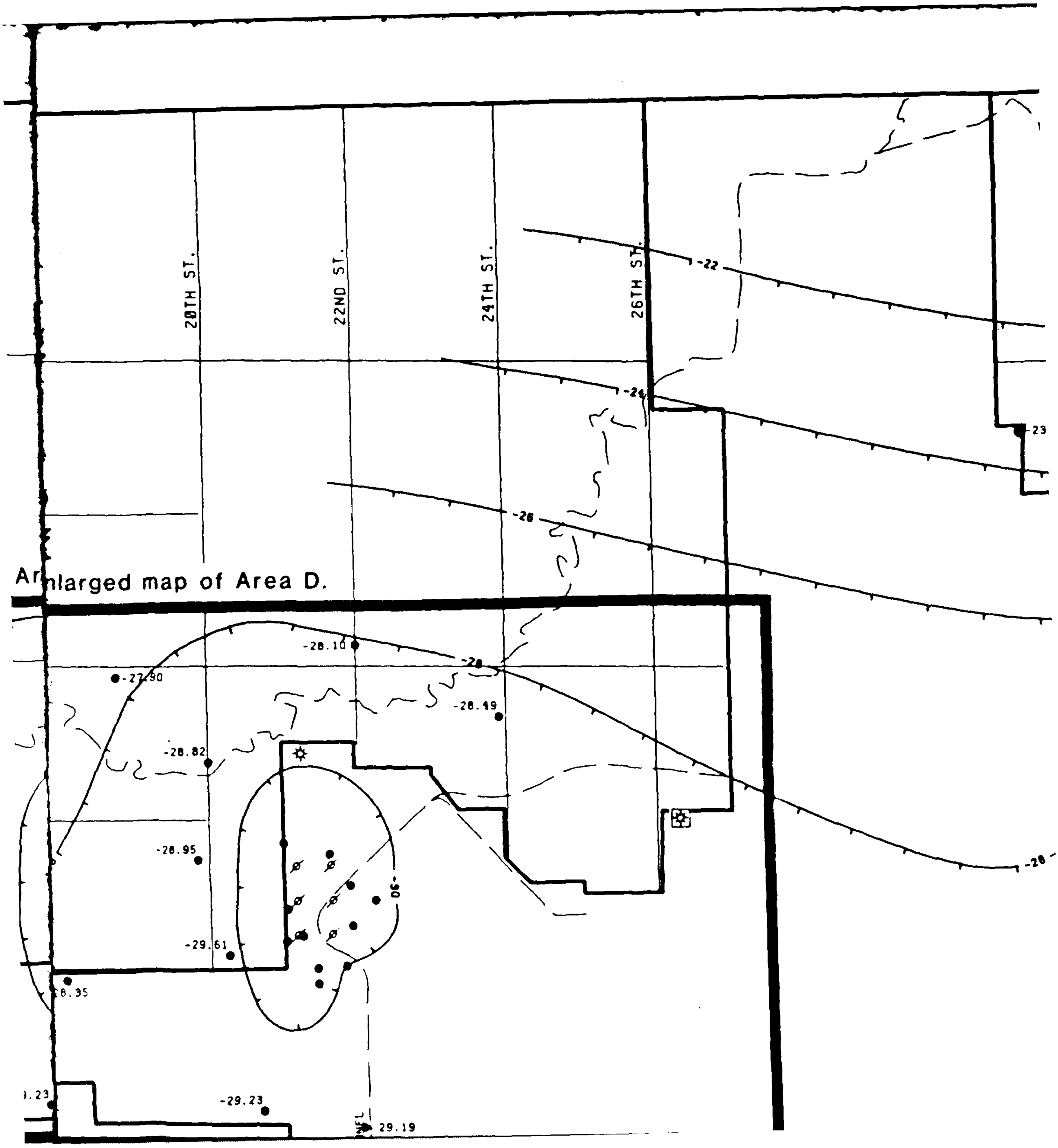
0 500 1000

SCALE IN FEET

GENERATED BY	Vivian Gaddie	DATE	7-14-88
PEER REVIEW	Deena A Stanley	DATE	7/14/88
PROJECT REVIEW	Tyler R Thompson	DATE	7-14-88

RADIAN
CORPORATION


ELKHORN
16TH ST.
20TH ST.
I ST.
G ST.
See enlarged map
E ST.
-27.90
-28.8
C ST.
-28.95
-28
DRY CREEK
ASCOT
-28.35
-26.67
MAGPIE CREEK
-27.70
VINCI
CLAIRE
-28.71
CHANNEL



An enlarged map of Area D.

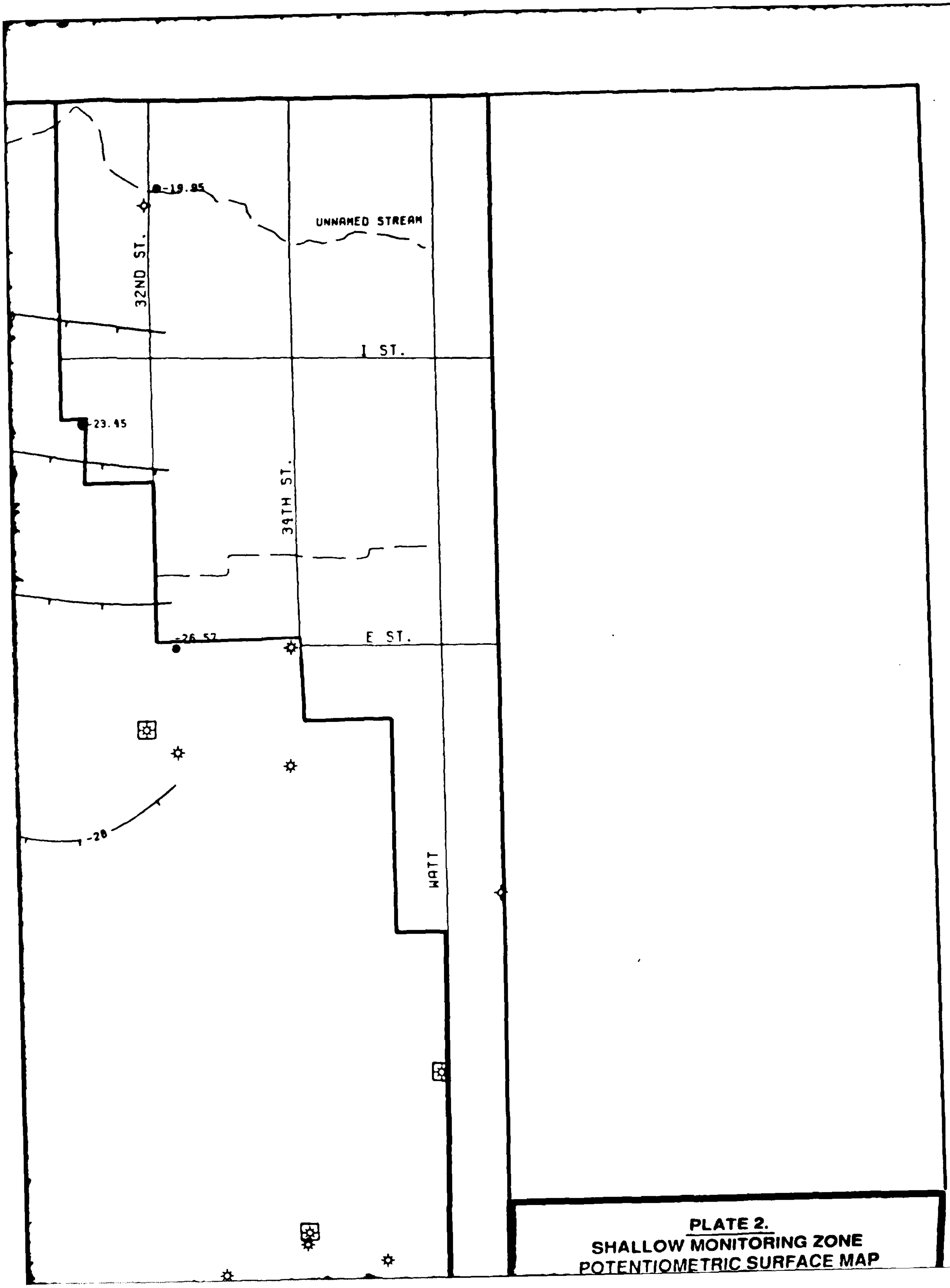
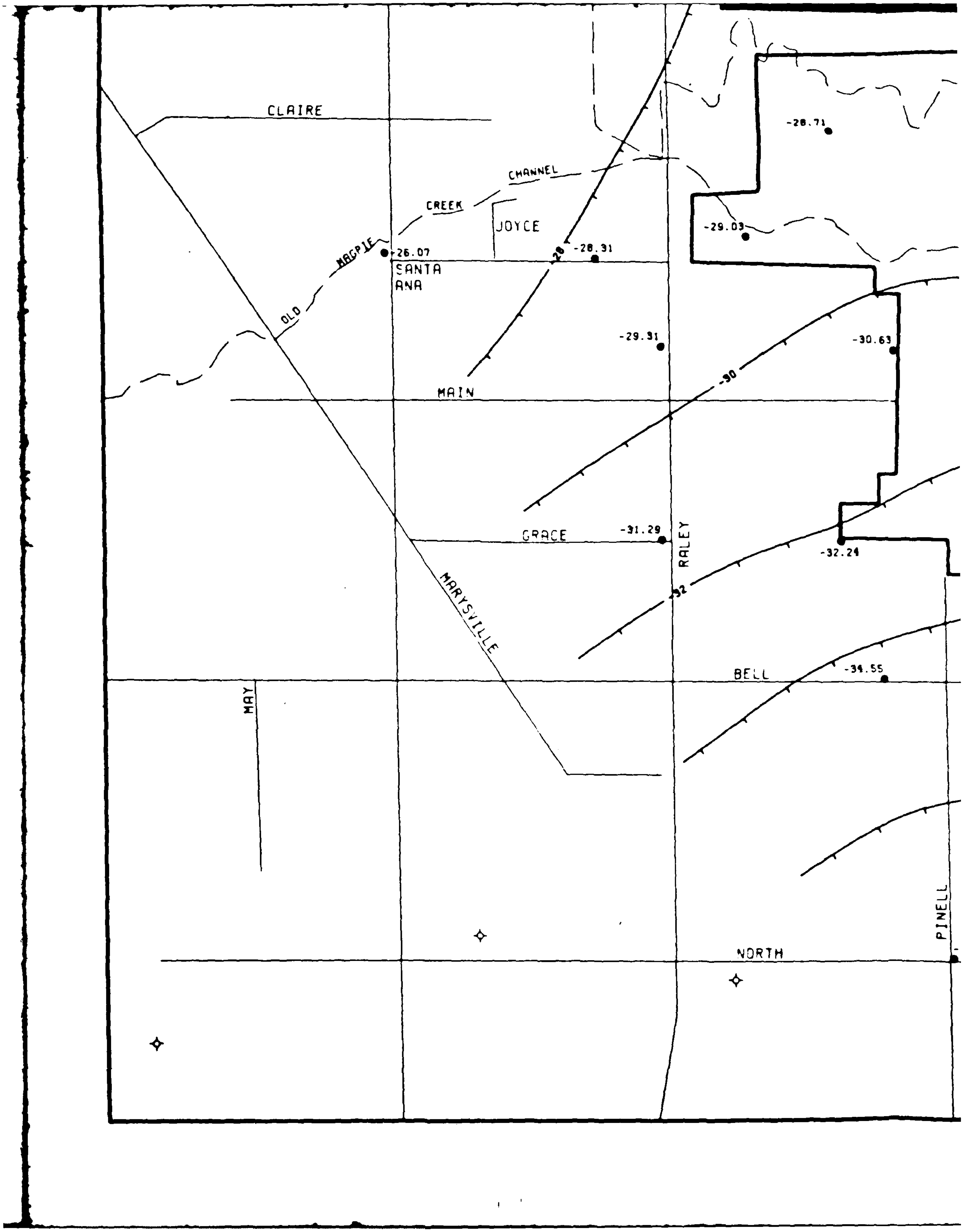


PLATE 2.
SHALLOW MONITORING ZONE
POTENTIOMETRIC SURFACE MAP



CLAIRE
CHANNEL
CREEK
MAGPIE
OLD
JOYCE
-26.07
SANTA ANA
-28
-28.31
-28.71
-29.03
-29.31
-30.63
-30
MAIN
GRACE
-31.29
RALEY
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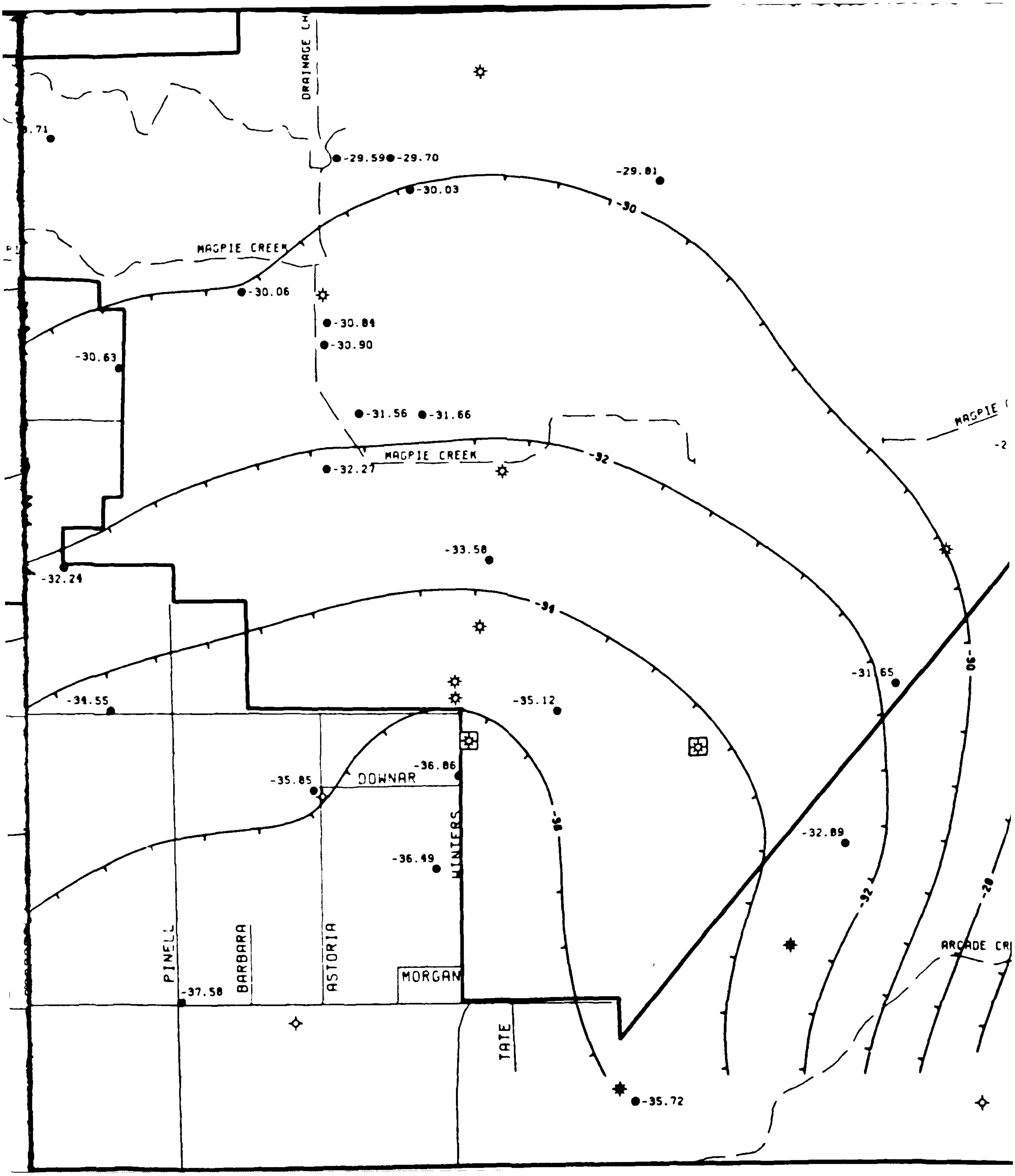
-32
MARYSVILLE
BELL
-34.55
MAY
PINELL
NORTH



DRAINAGE CH
.71
-29.59
-29.70
-29.81
-30.03
-30
MAGPIE CREEK
-30.06
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-30.90
-30.63
-31.56
-31.66
MAGPIE
MAGPIE CREEK
-32.27
-32
-32.24
-33.58
-34
-34.55
-35.12
-31.65
-30
-36.86
-35.85
DOWNAR
WINTERS
-36.49
-36
-32.89
-32
-28
ARCADE CR
PINELL
BARBARA
ASTORIA
MORGAN
-37.58
TATE
-35.72

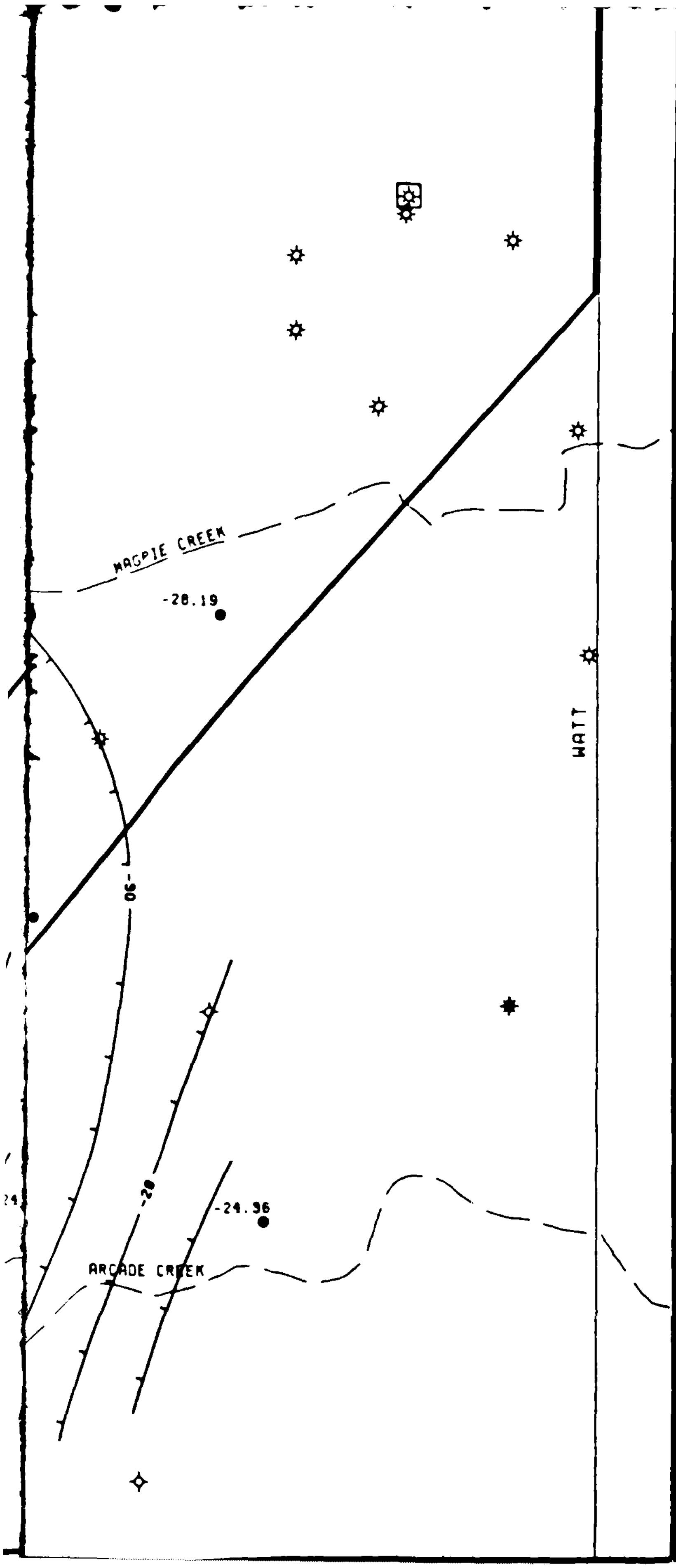


PLATE 2.

SHALLOW MONITORING ZONE POTENTIOMETRIC SURFACE MAP FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

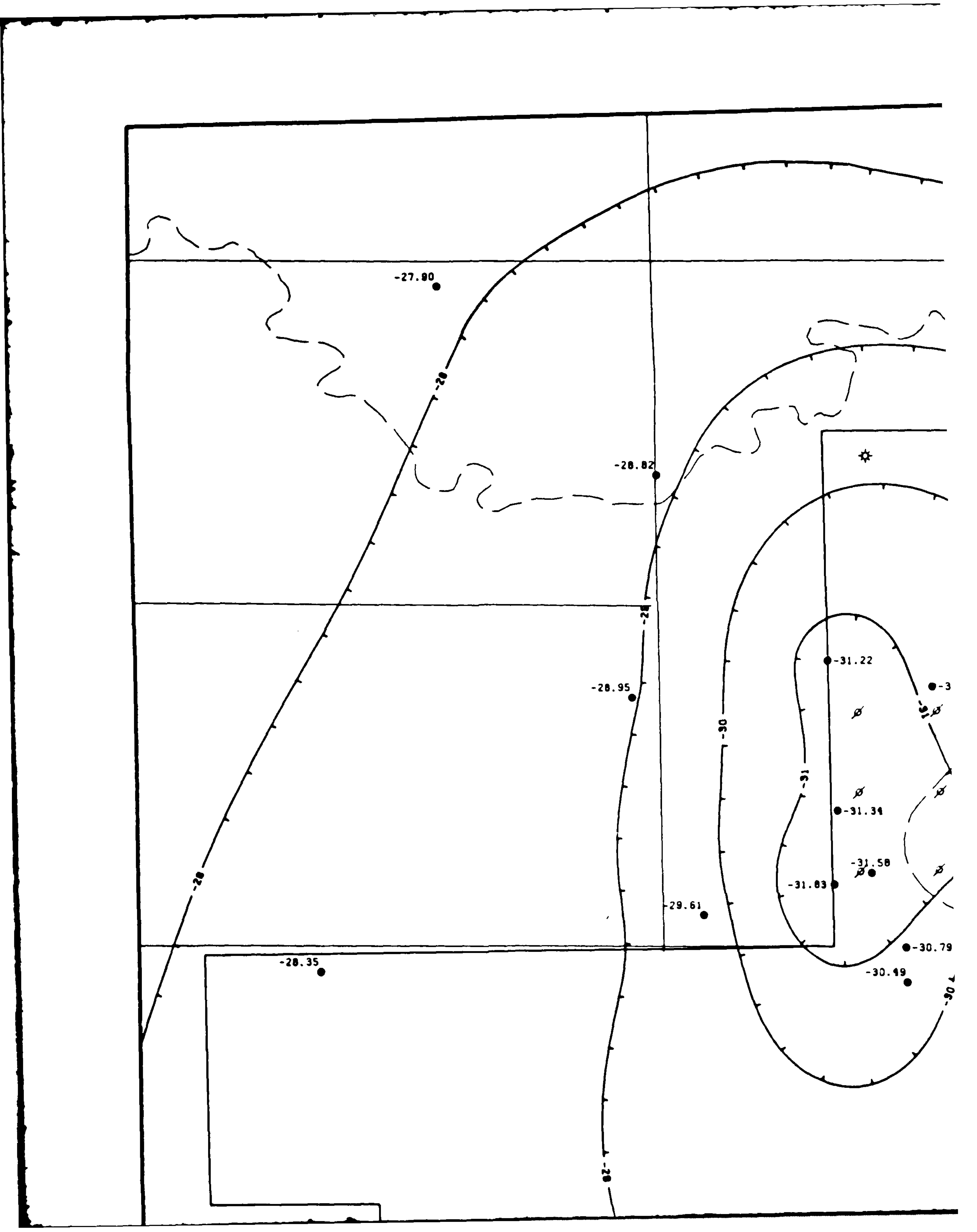
- McCLELLAN AFB BOUNDARY
- STREAMS
- POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT MSL) — 30
- SHALLOW ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

0 500 1000
SCALE IN FEET

GENERATED BY Vivian Gaddis DATE 7-14-88
PEER REVIEW Deena A Stanley DATE 7/14/88
PROJECT REVIEW Tyler P. Thompson DATE 7-14-88

RADIAN CORPORATION



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-28.82
-28
-28.95
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-31.22
-3
-31
-31
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-28
-30.79
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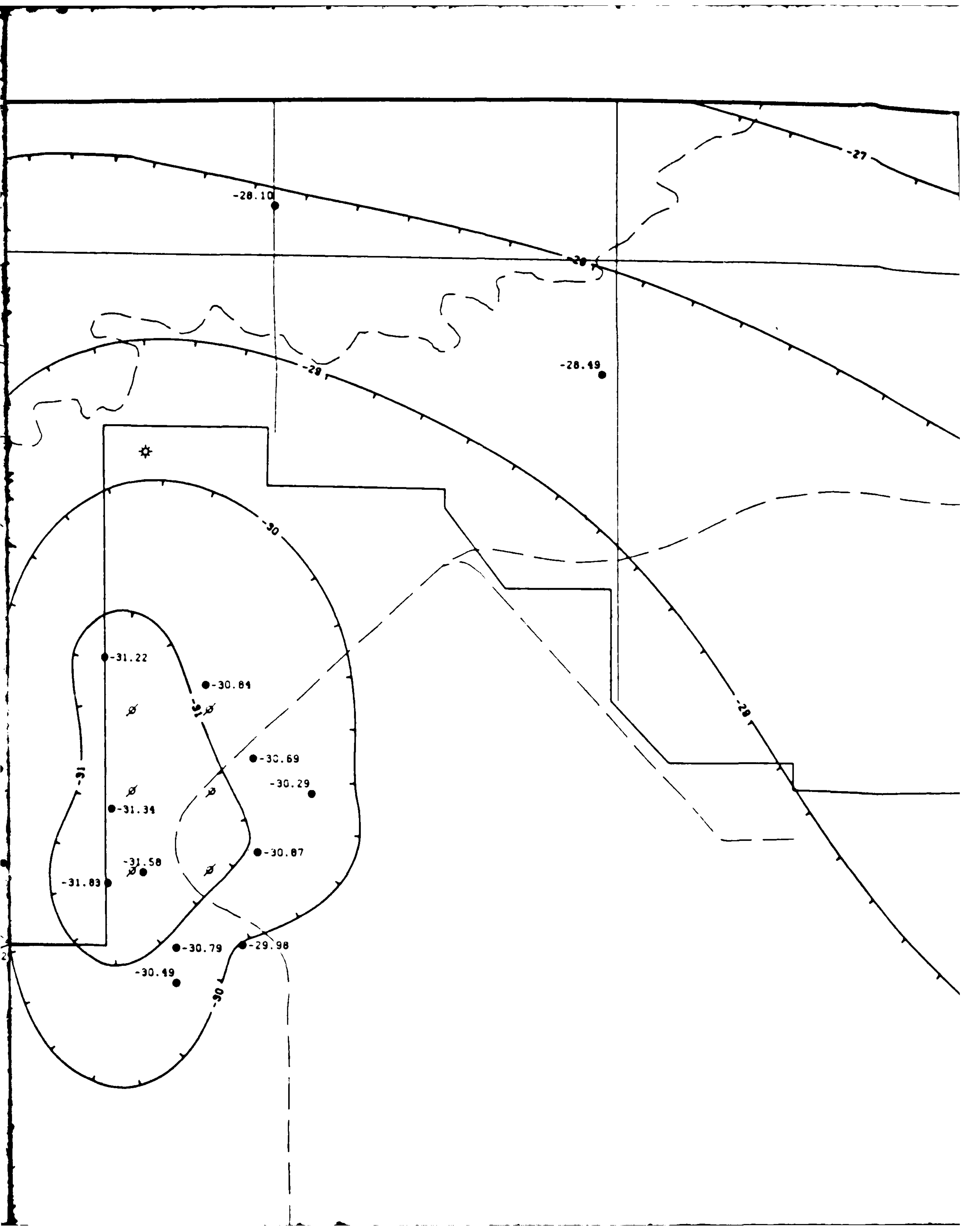
-30.49
-30
-28



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-31
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-30.79
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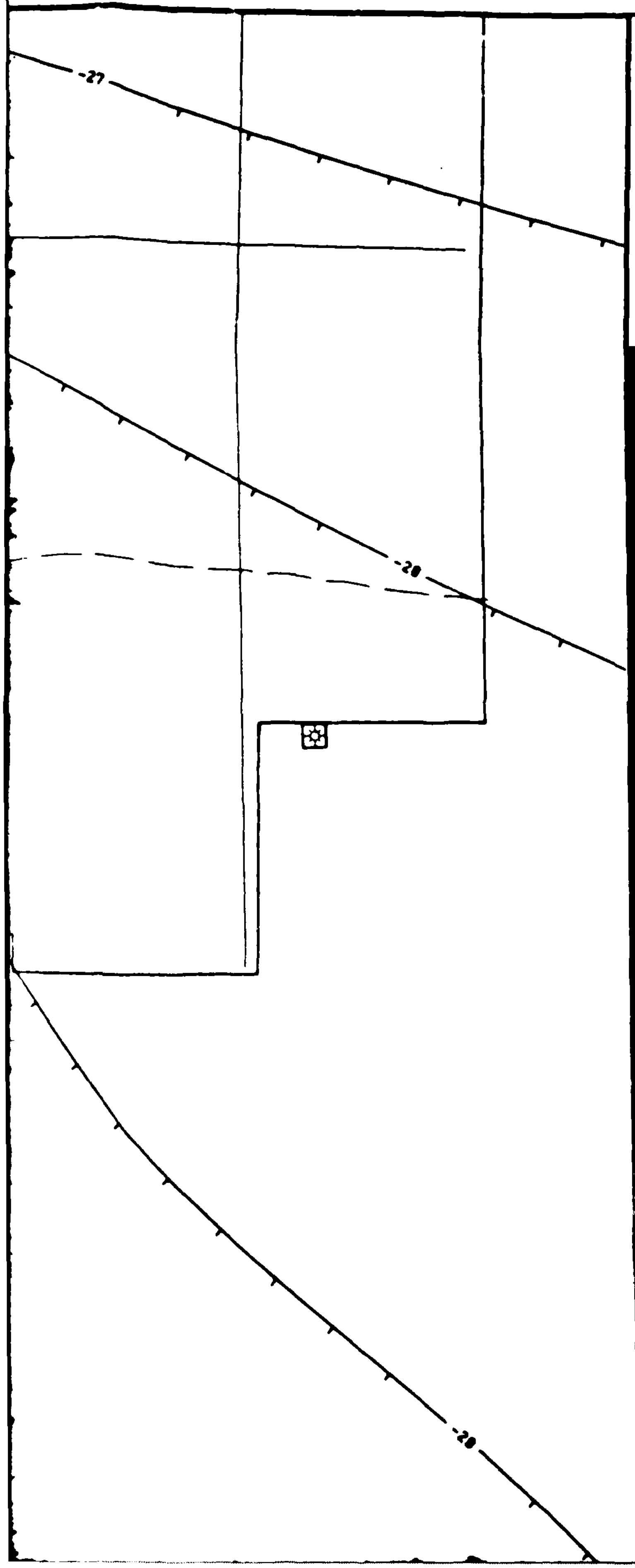


PLATE 3.
AREA D - SHALLOW MONITORING ZONE
POTENTIOMETRIC SURFACE MAP
FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

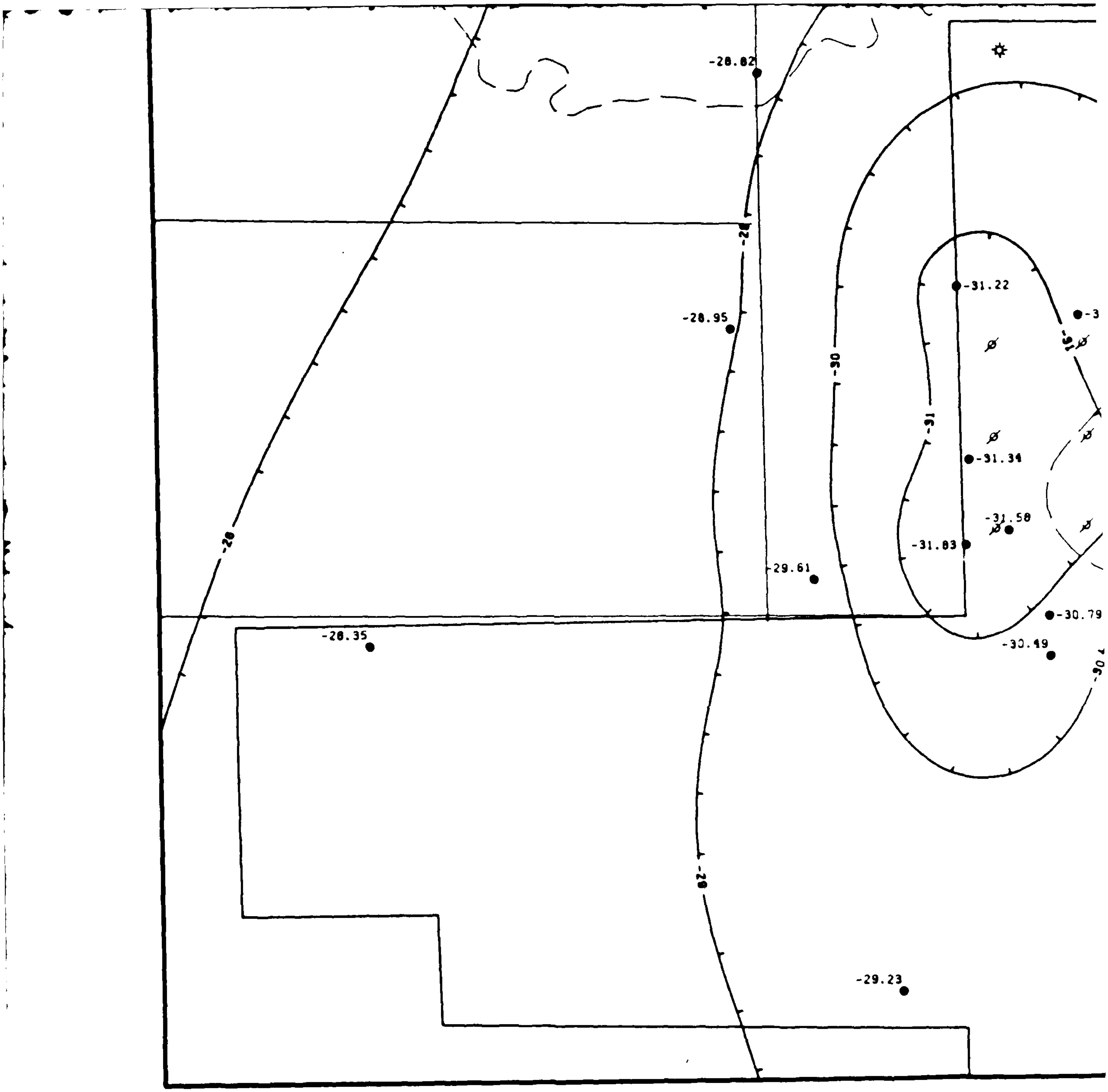
LEGEND

- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT MSL)
- SHALLOW ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

0 200 400
SCALE IN FEET

GENERATED BY	Vivian Gaddie	DATE	7-14-88
PEER REVIEW	Deena A Stanley	DATE	7/14/88
PROJECT REVIEW	Tyler P. Thompson	DATE	7/14/88



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-28.95
-28
-29.61
-28.35
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-29.23
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-31.22
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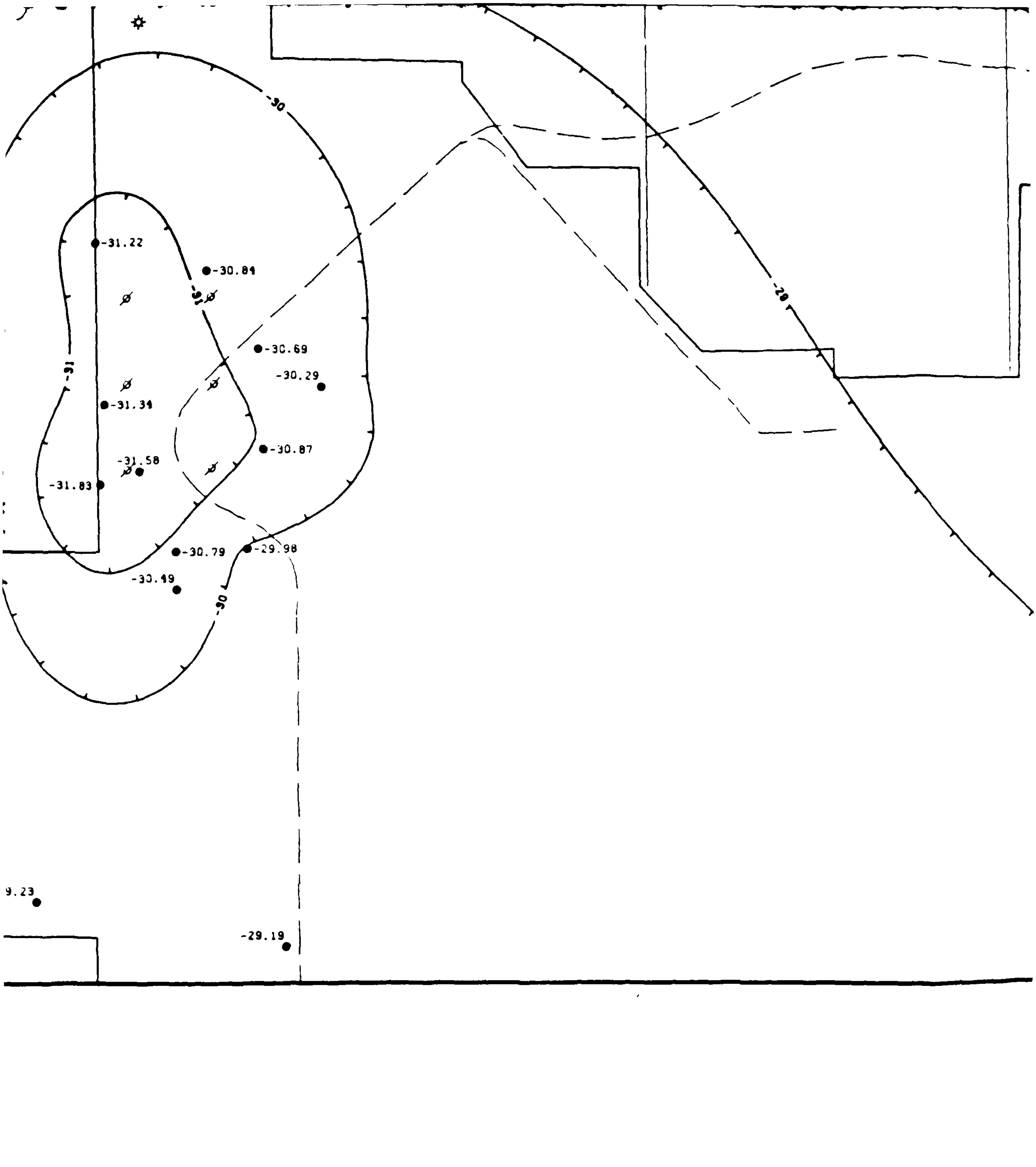
-30.79
-30.49
-30



-30
-31
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-30.84
-30.69
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-30.49
9.23
-29.19

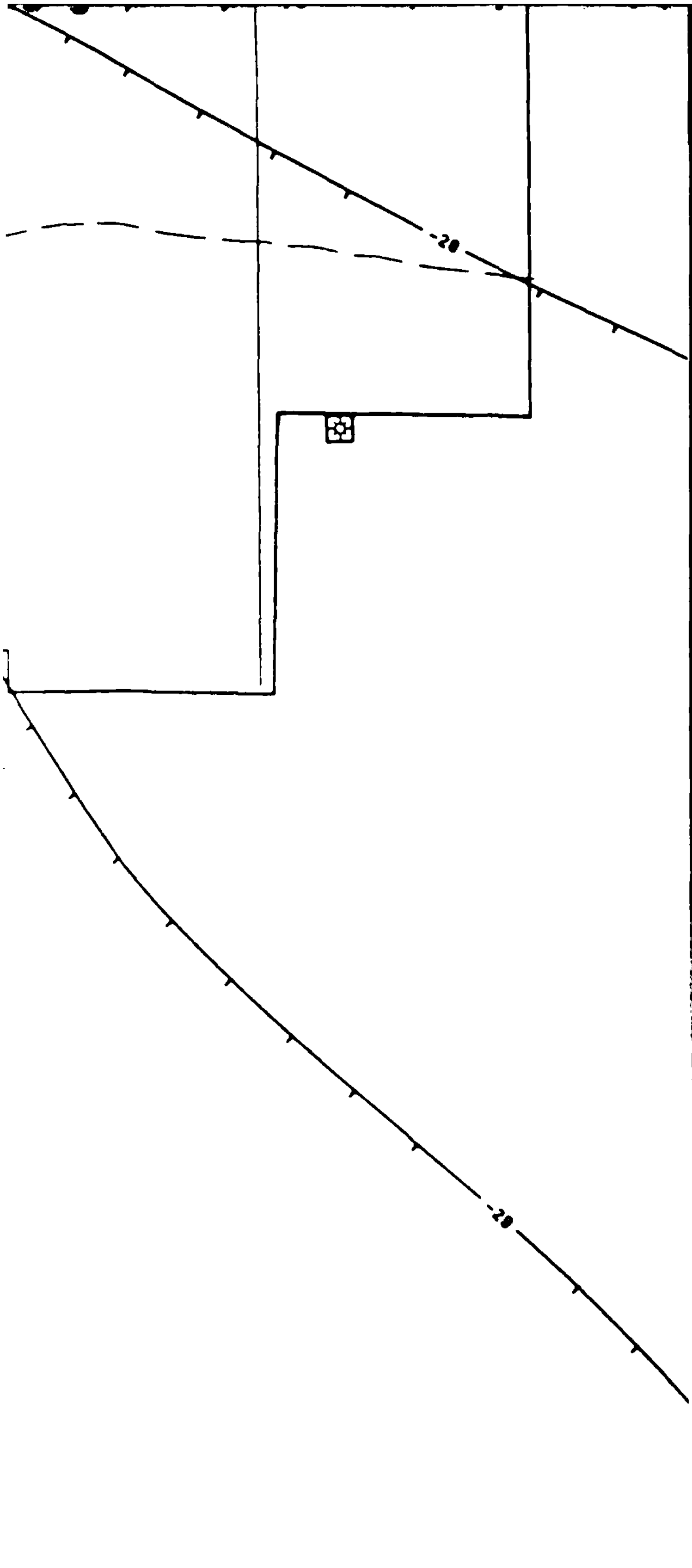


PLATE 3.

AREA D - SHALLOW MONITORING ZONE POTENTIOMETRIC SURFACE MAP FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

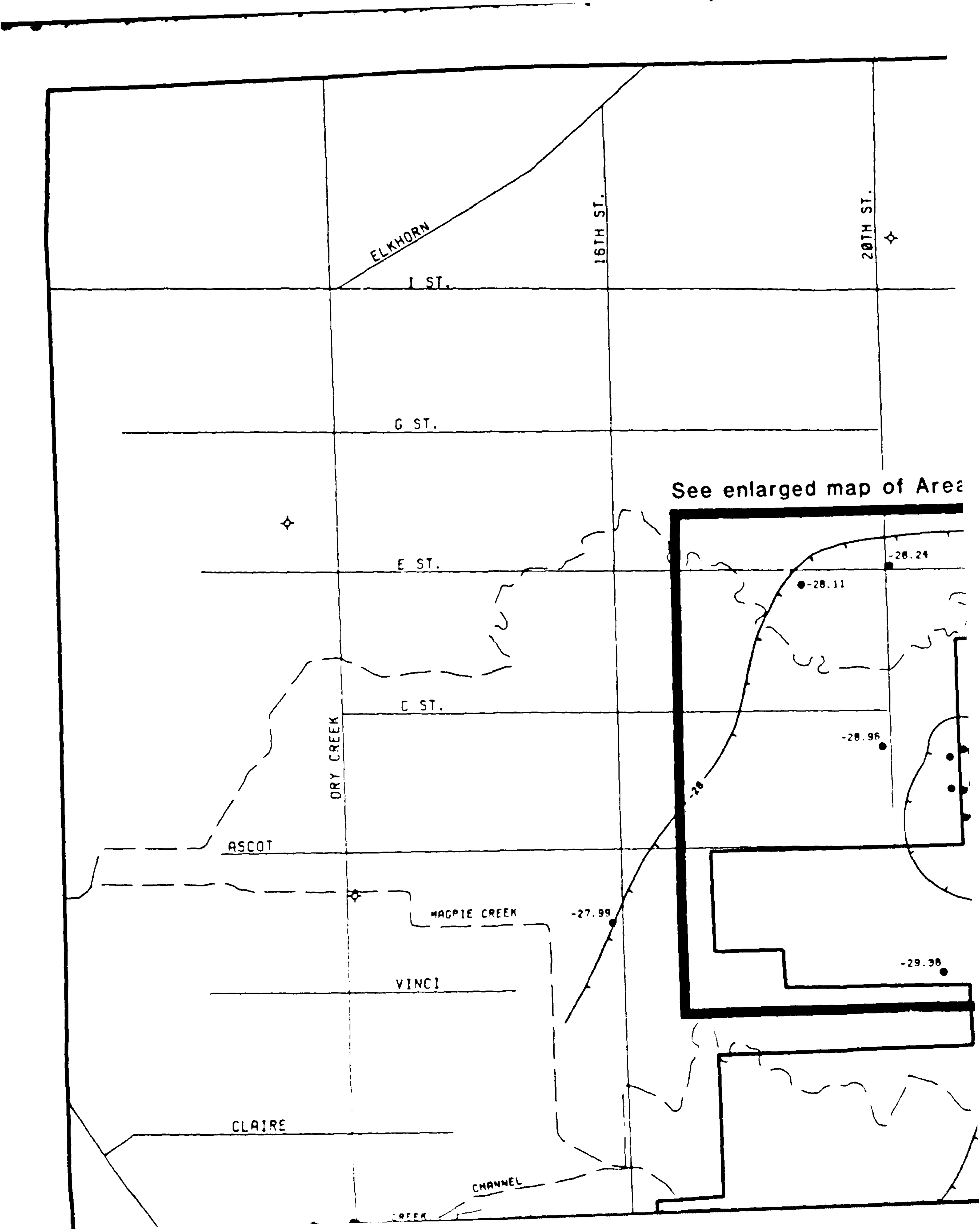
- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 — POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT MSL)
- SHALLOW ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

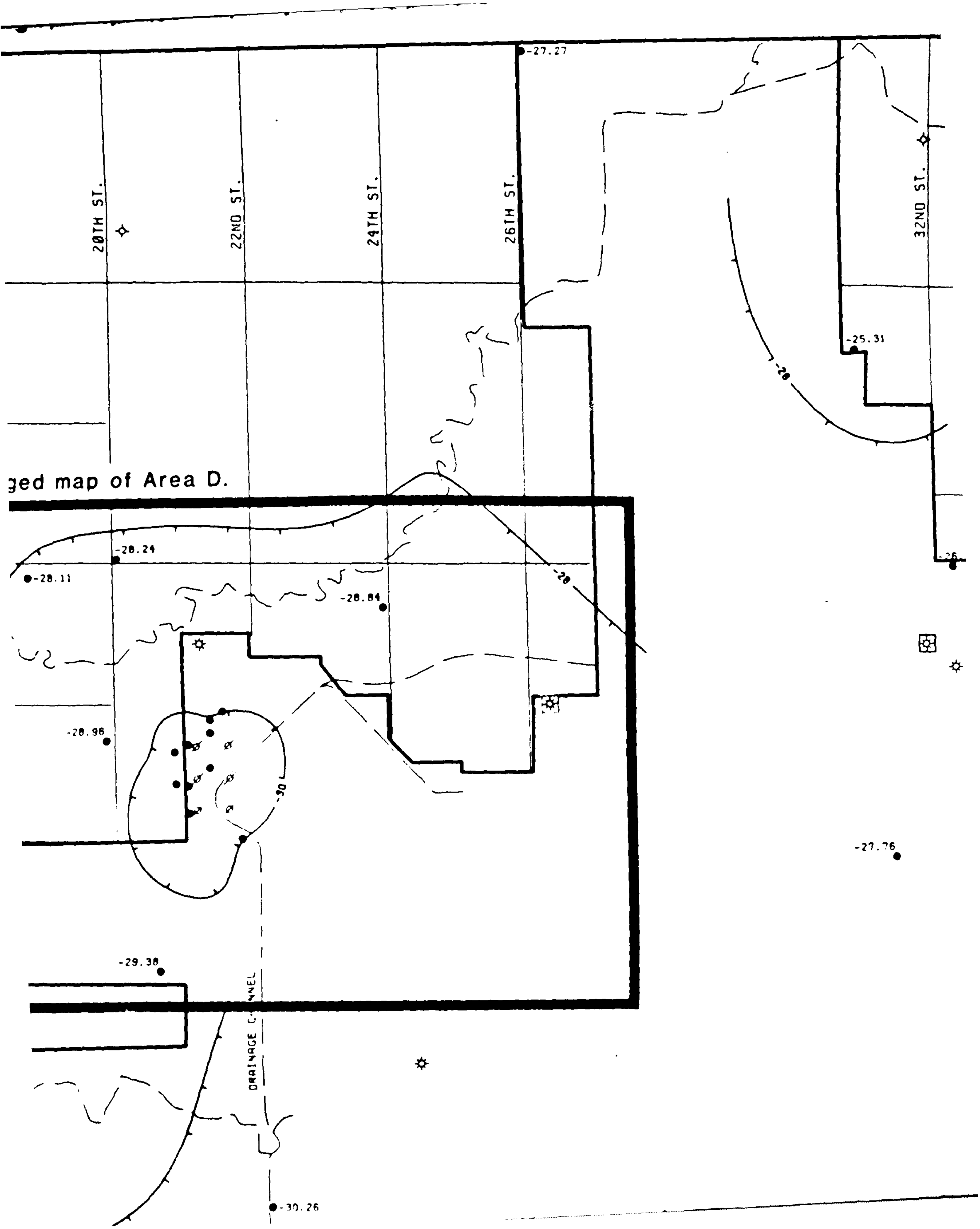
N

0 200 400
SCALE IN FEET

GENERATED BY	Vivian Haddie	DATE	7-14-88
PEER REVIEW	Deena A Stanley	DATE	7/14/88
PROJECT REVIEW	Tyler P. Thompson	DATE	7/14/88

RADIAN CORPORATION


ELKHORN
16TH ST.
20TH ST.
I ST.
G ST.
See enlarged map of Area
E ST.
-28.24
-28.11
C ST.
-28.96
DRY CREEK
-28
ASCOT
MAGPIE CREEK
-27.99
-29.38
VINCI
CLAIRE
CHANNEL



ged map of Area D.

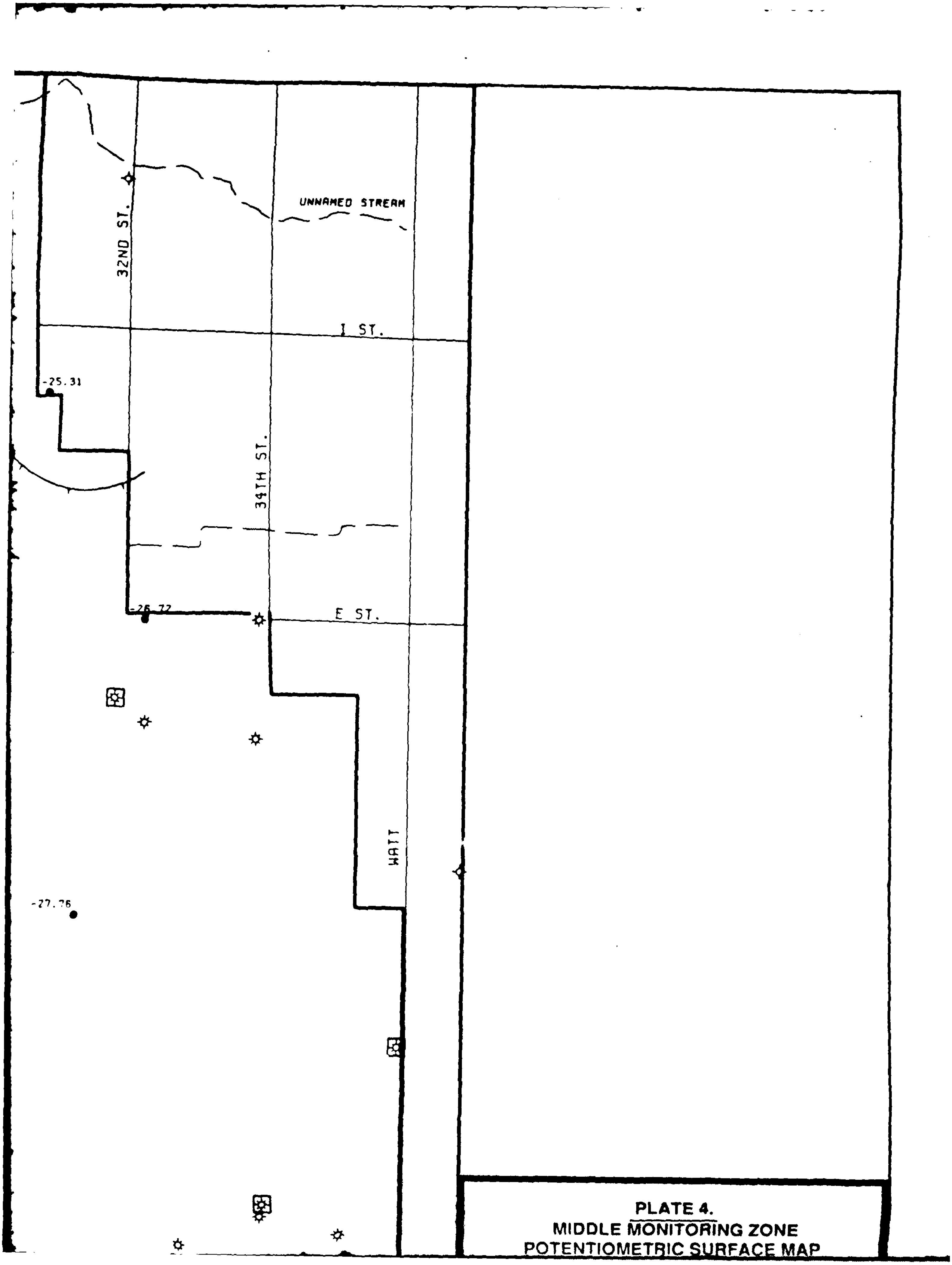
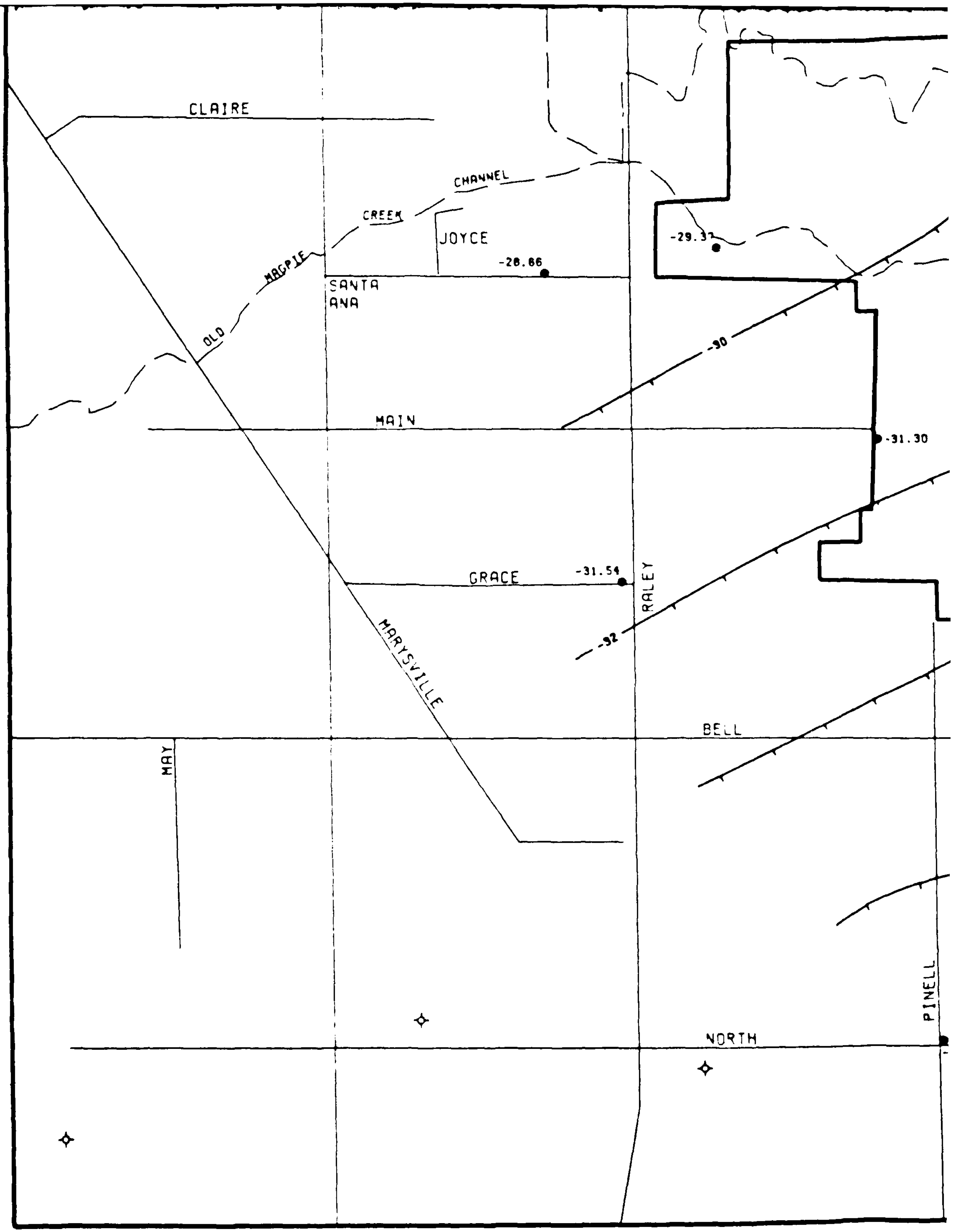


PLATE 4.
MIDDLE MONITORING ZONE
POTENTIOMETRIC SURFACE MAP



CLAIRE
CHANNEL
CREEK
MAGPIE
OLD
JOYCE
-28.86
-29.37
SANTA
ANA
-30
MAIN
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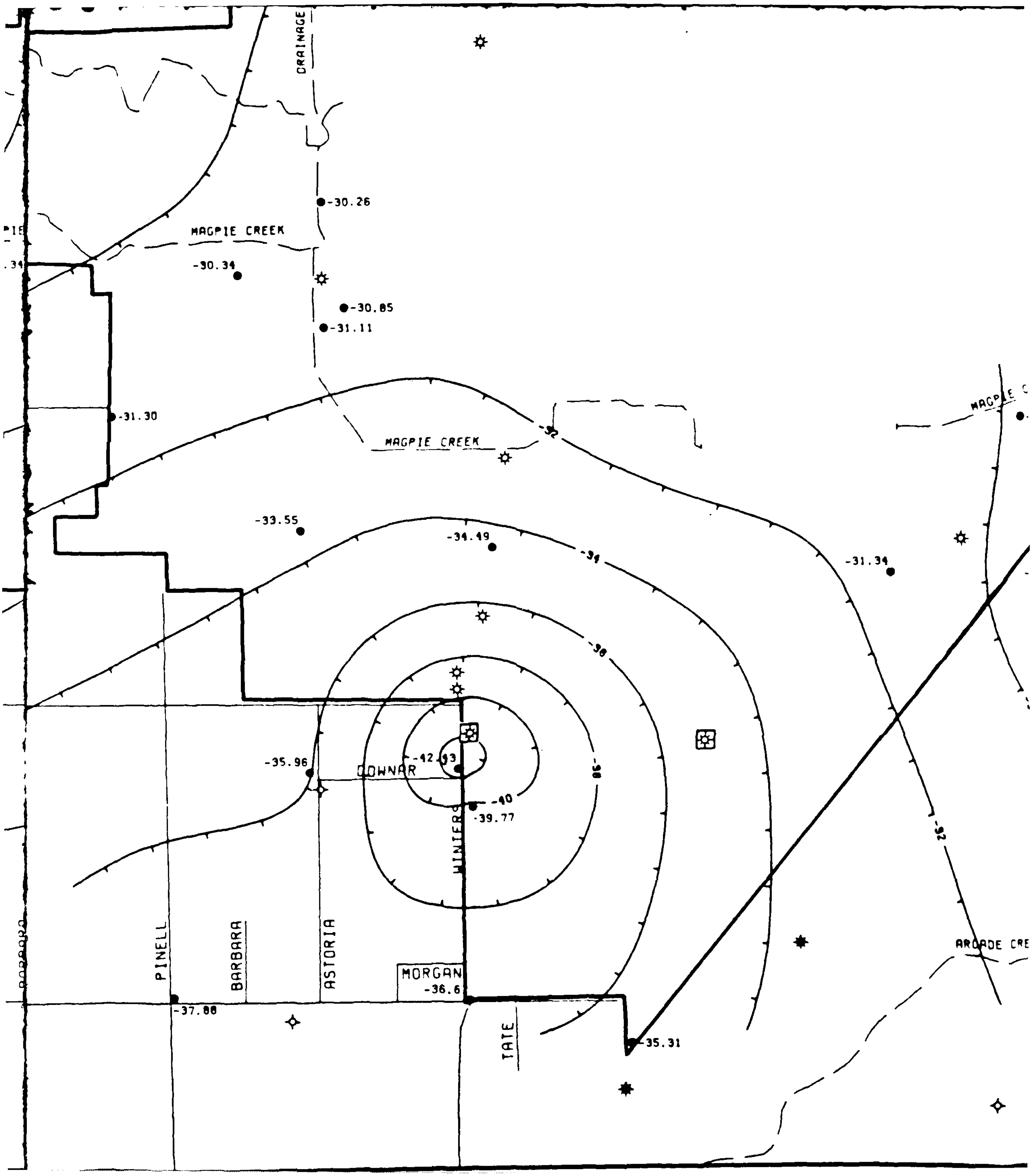
GRACE
-31.54
RALEY
-32
MARYSVILLE
BELL
MAY
PINELL
NORTH



DRAINAGE
-30.26
MAGPIE CREEK
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MAGPIE CREEK
MAGPIE C
-32
-33.55
-34.49
-34
-31.34
-36
-38
-35.96
DOWNAR
-42
-40
-39.77
WINTERS
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PINELL
BARBARA
ASTORIA
MORGAN
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-37.88
TATE
-35.31
ARCADE CRE

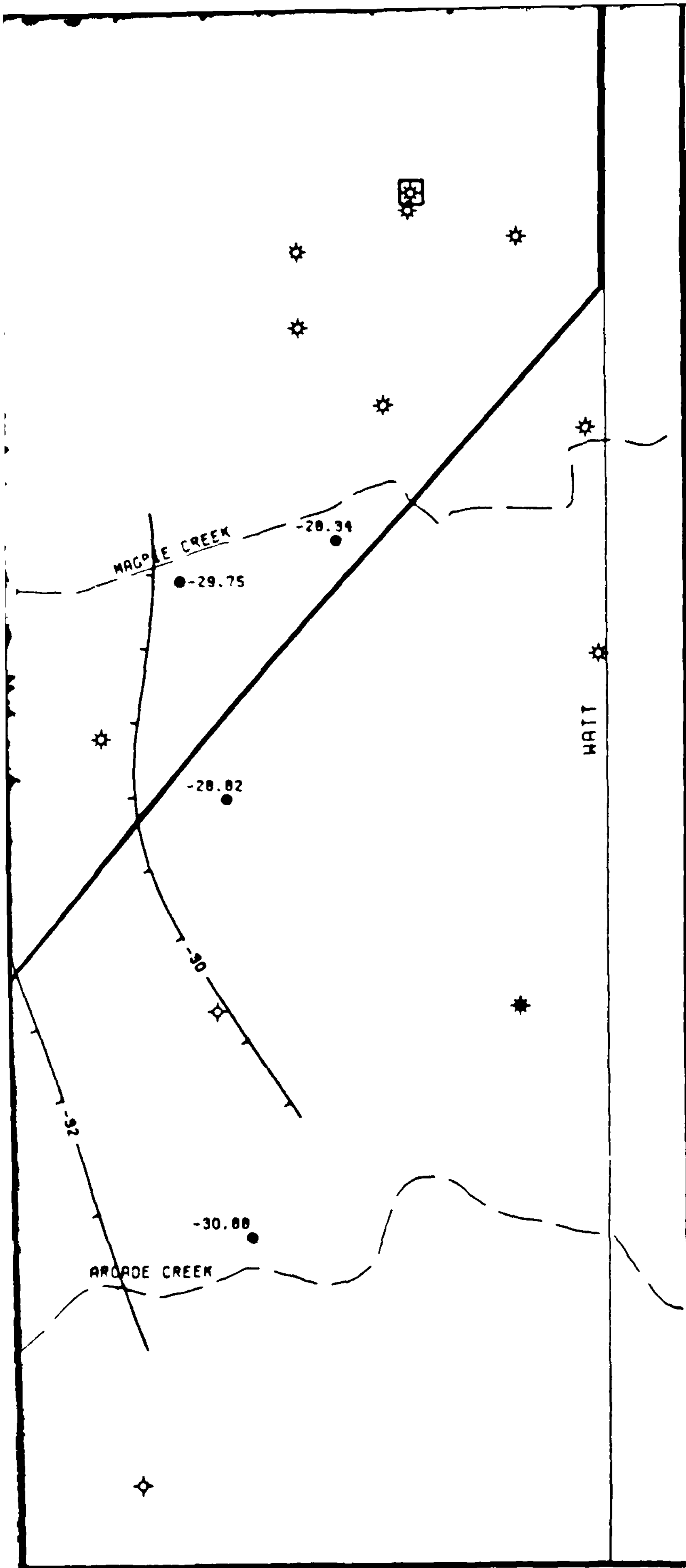


PLATE 4.

MIDDLE MONITORING ZONE POTENTIOMETRIC SURFACE MAP FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

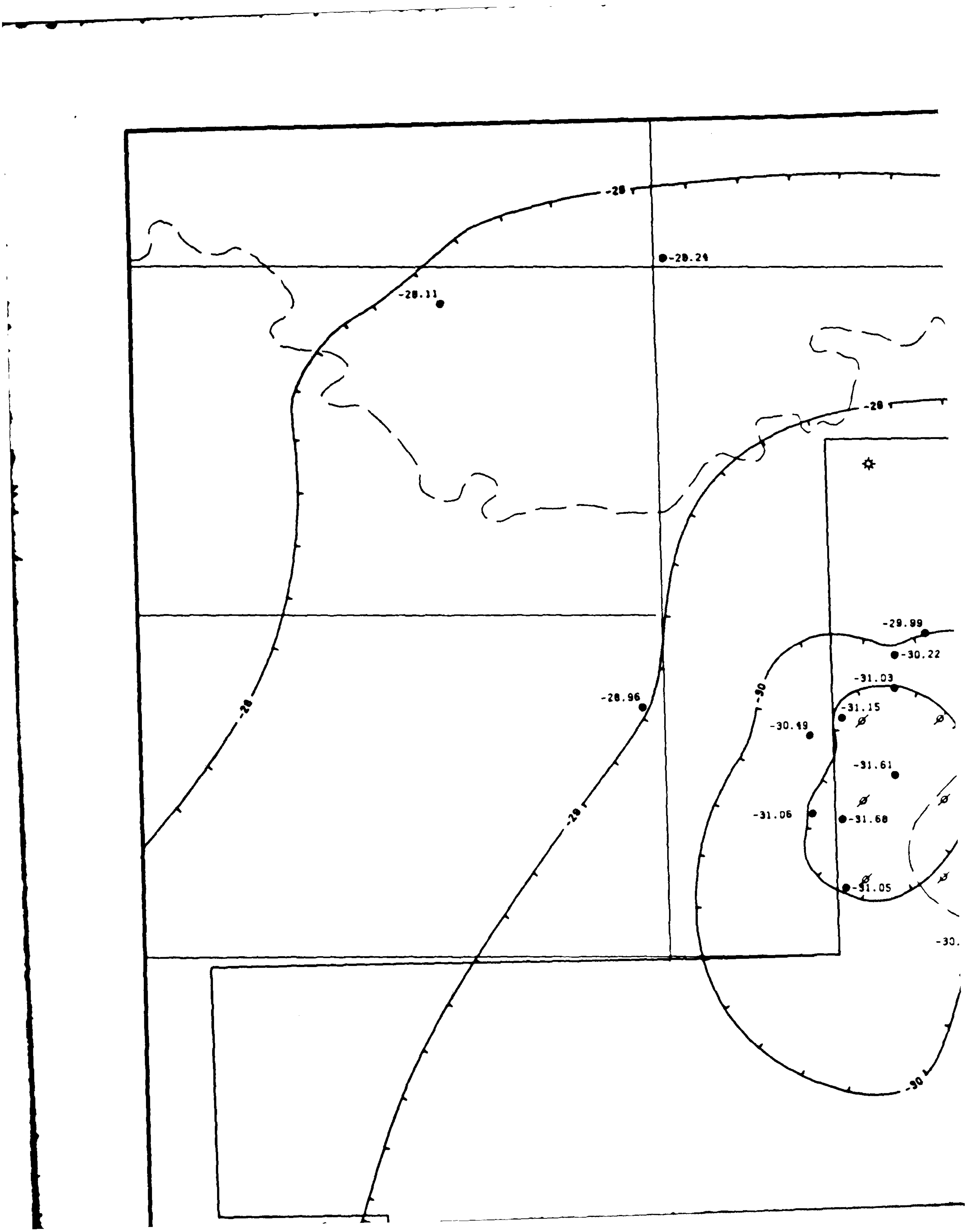
- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT MSL)
- MIDDLE ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

0 500 1000
SCALE IN FEET

GENERATED BY Vivian Gaddie	DATE 7-14-88
PEER REVIEW Deena A Stanley	DATE 7/14/88
PROJECT REVIEW Tyler P. Thompson	DATE 7-14-88

RADIAN CORPORATION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-31.05
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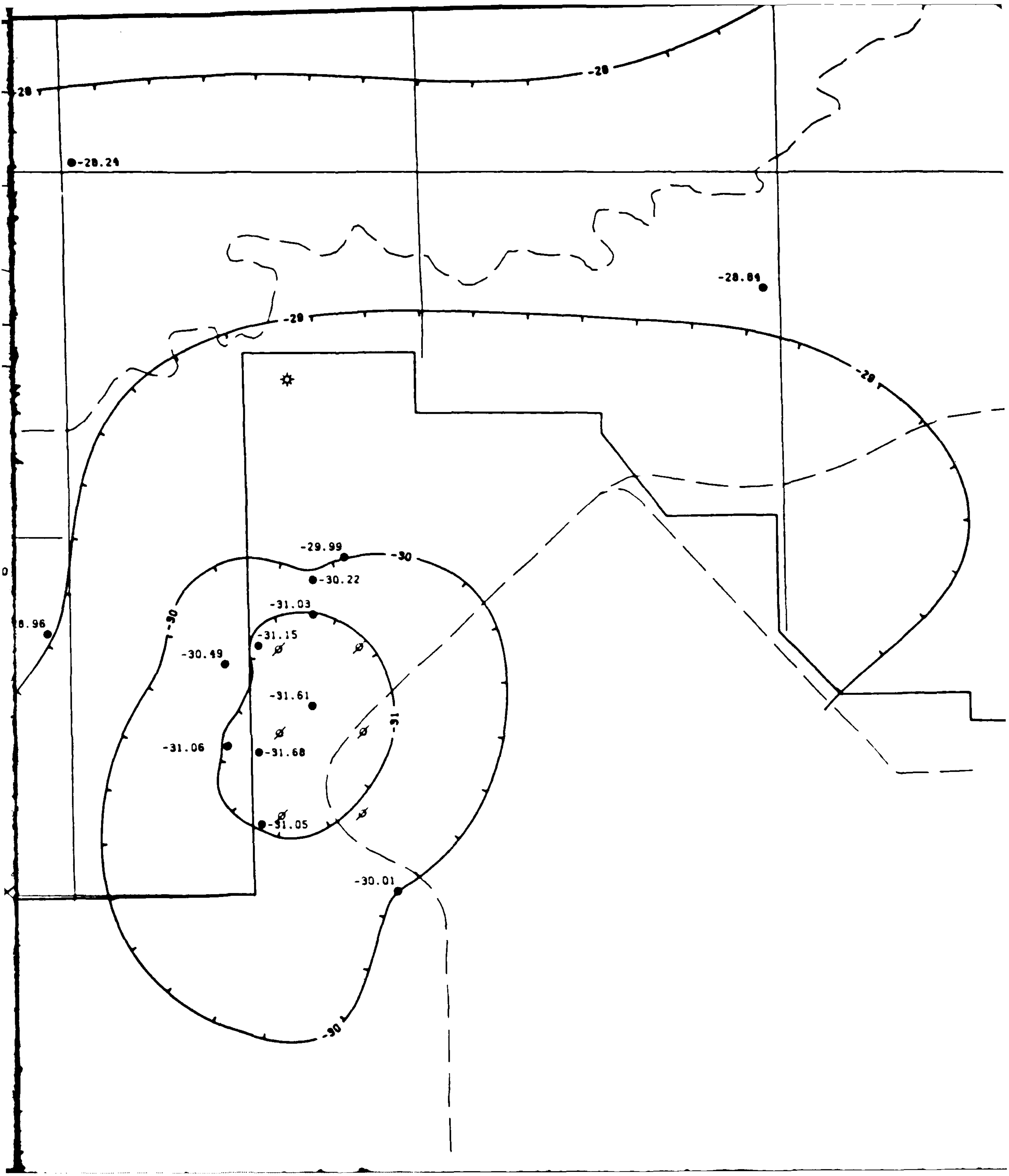
-30



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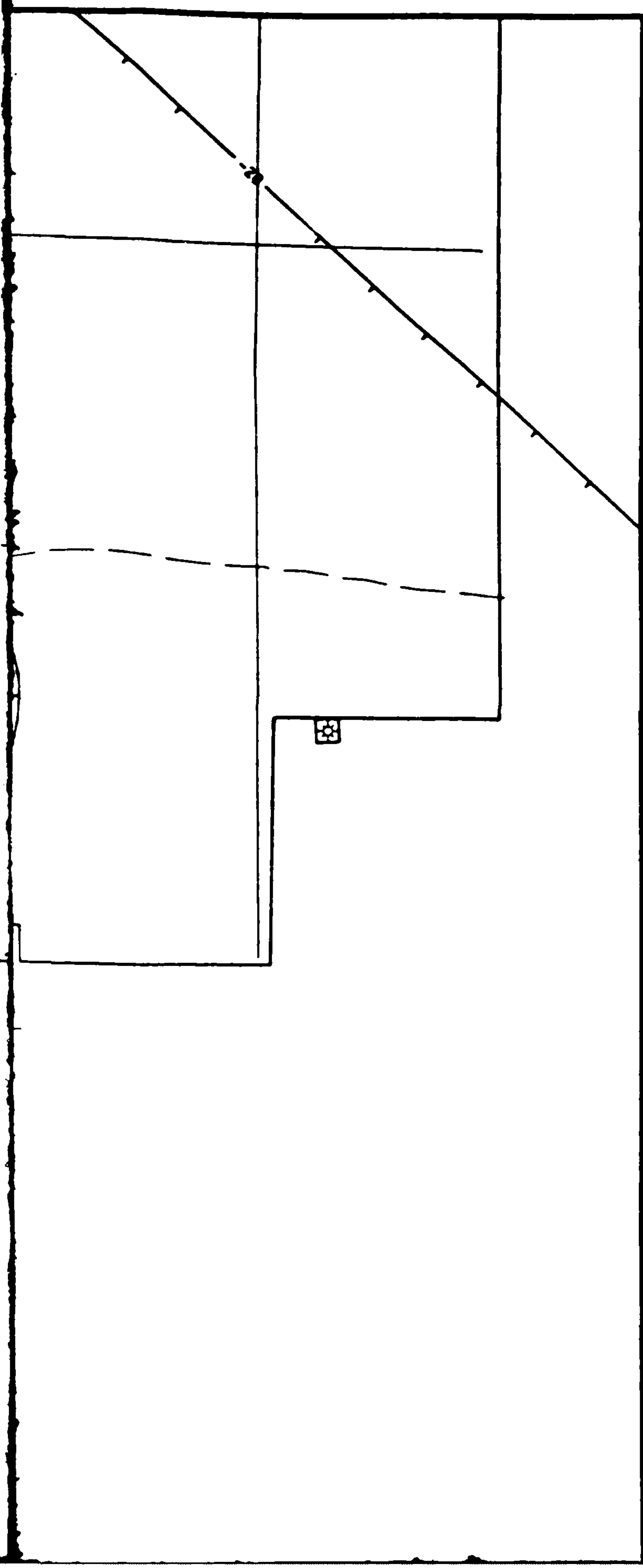


PLATE 5.
AREA D - MIDDLE MONITORING ZONE
POTENTIOMETRIC SURFACE MAP
FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

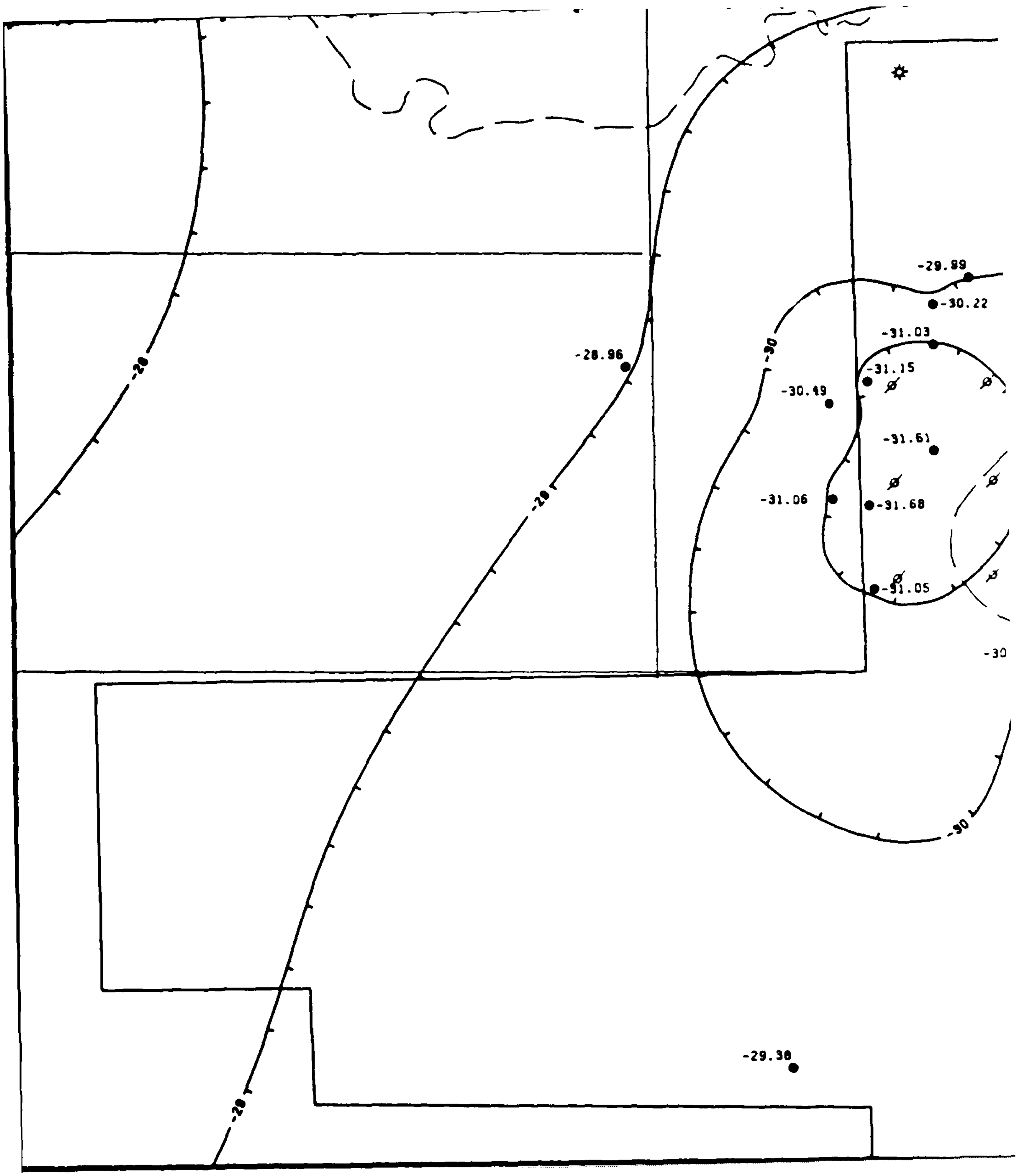
LEGEND:

	McCLELLAN AFB BOUNDARY
	STREAMS
30	POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT MSL)
	MIDDLE ZONE MONITORING WELL
	INACTIVE BASE PRODUCTION WELL
	ACTIVE BASE PRODUCTION WELL
	CITY WELL
	CALTRANS WELL
	EXTRACTION WELL

N

0 200 400
SCALE IN FEET

GENERATED BY Vivian Yaddie	DATE: 7-14-88
PEER REVIEW Deana A Stanley	DATE: 7/14/88
PROJECT REVIEW Tyler P. Thompson	DATE: 7/14/88



-29.99
-30.22
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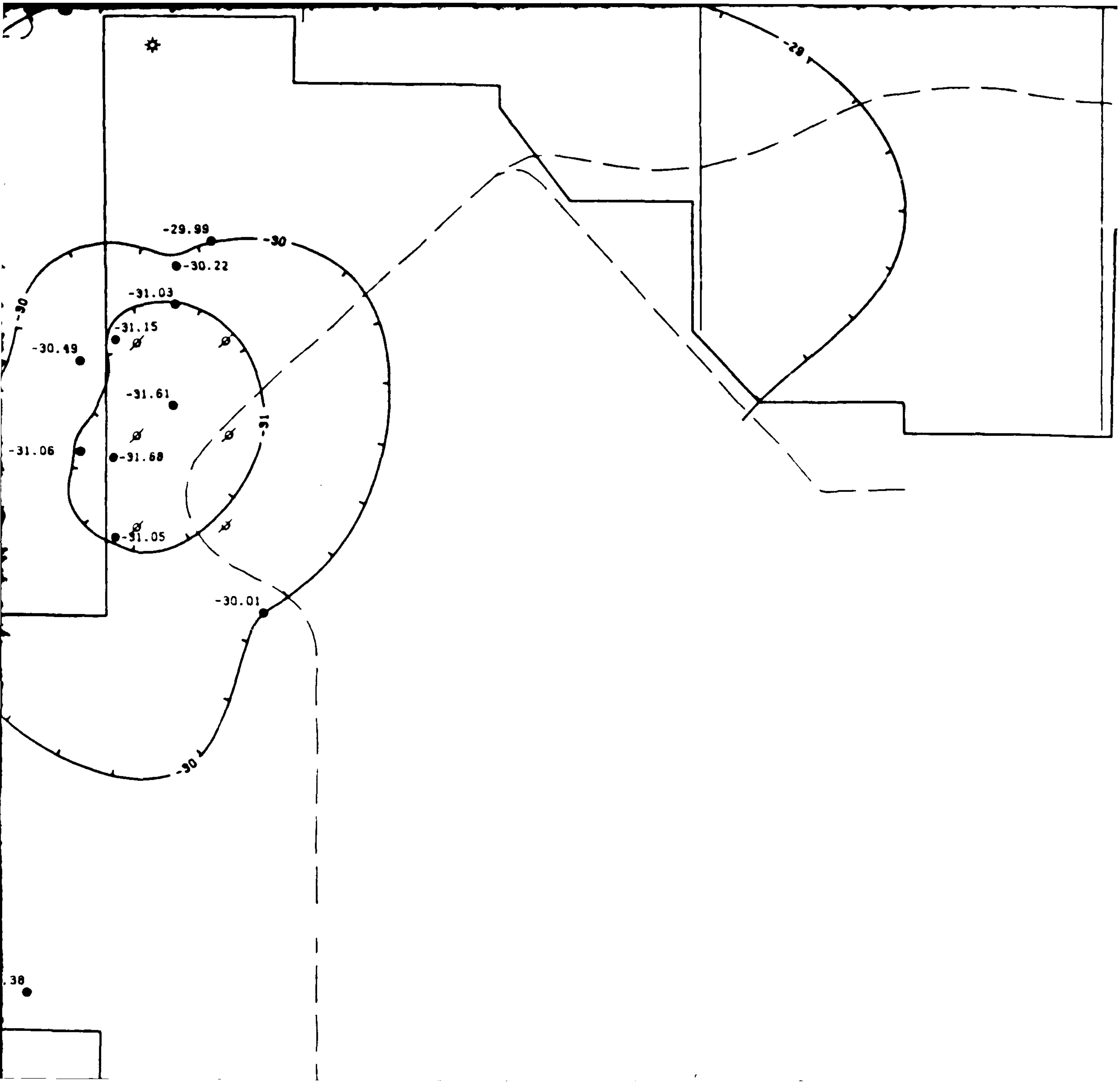

-29.99
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-31.03
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-31.06
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-29
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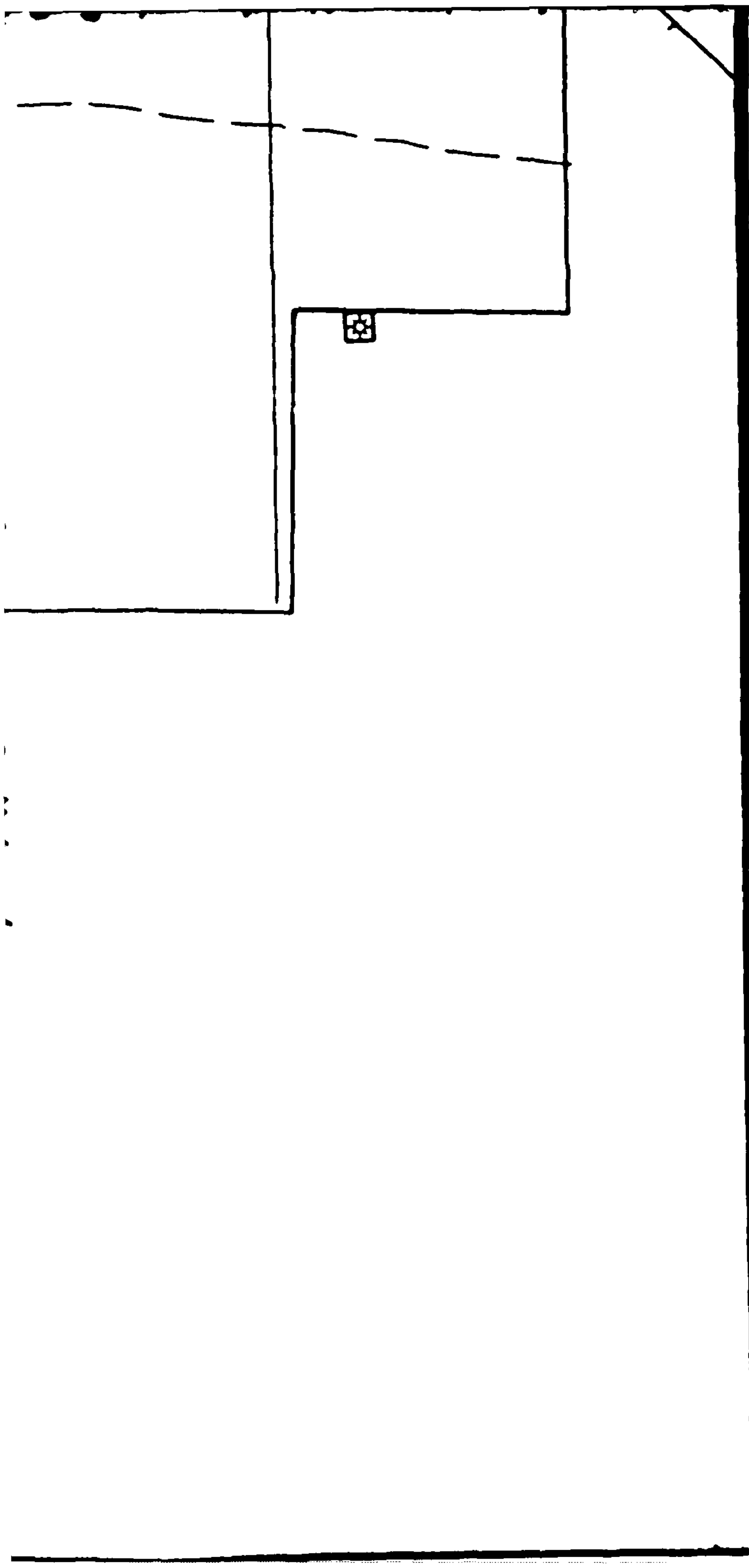


FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

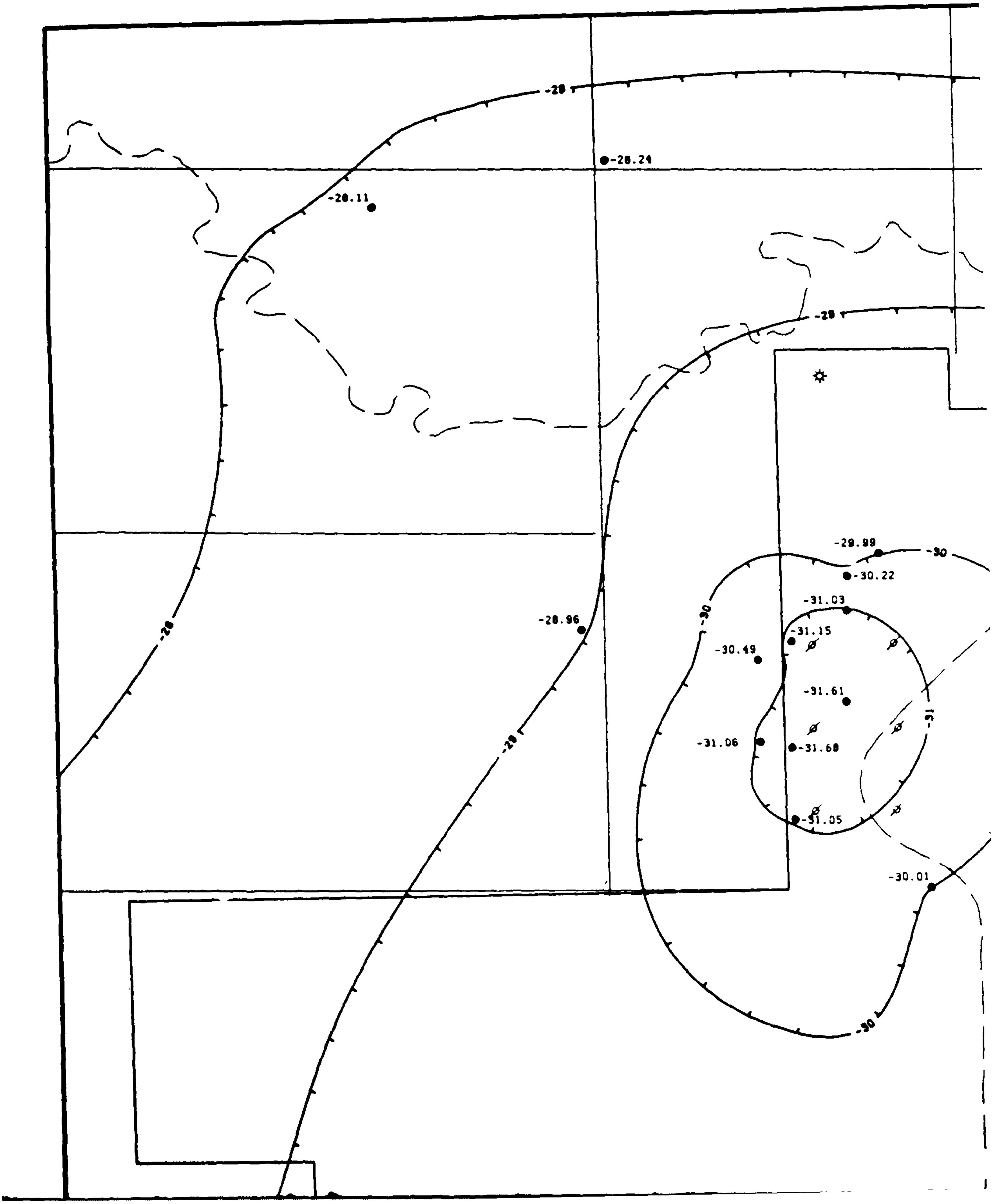
- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 — POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT. MSL)
- MIDDLE ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

0 200 400
SCALE IN FEET

GENERATED BY: Vivian Gaddie	DATE: 7-14-88
PEER REVIEW: Deana A Stanley	DATE: 7/14/88
PROJECT REVIEW: Tyler P. Thompson	DATE: 7/14/88

RADIAN CORPORATION



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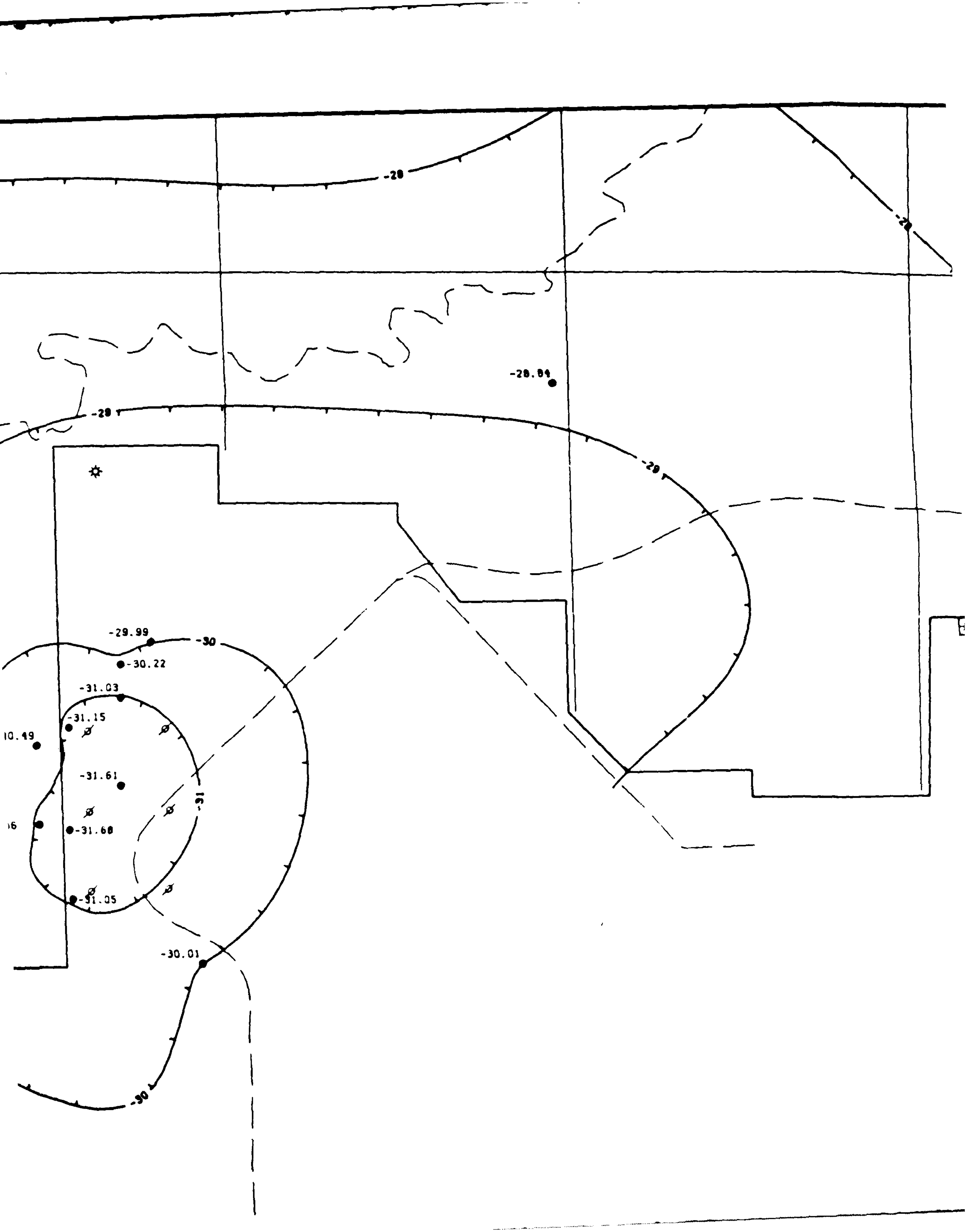

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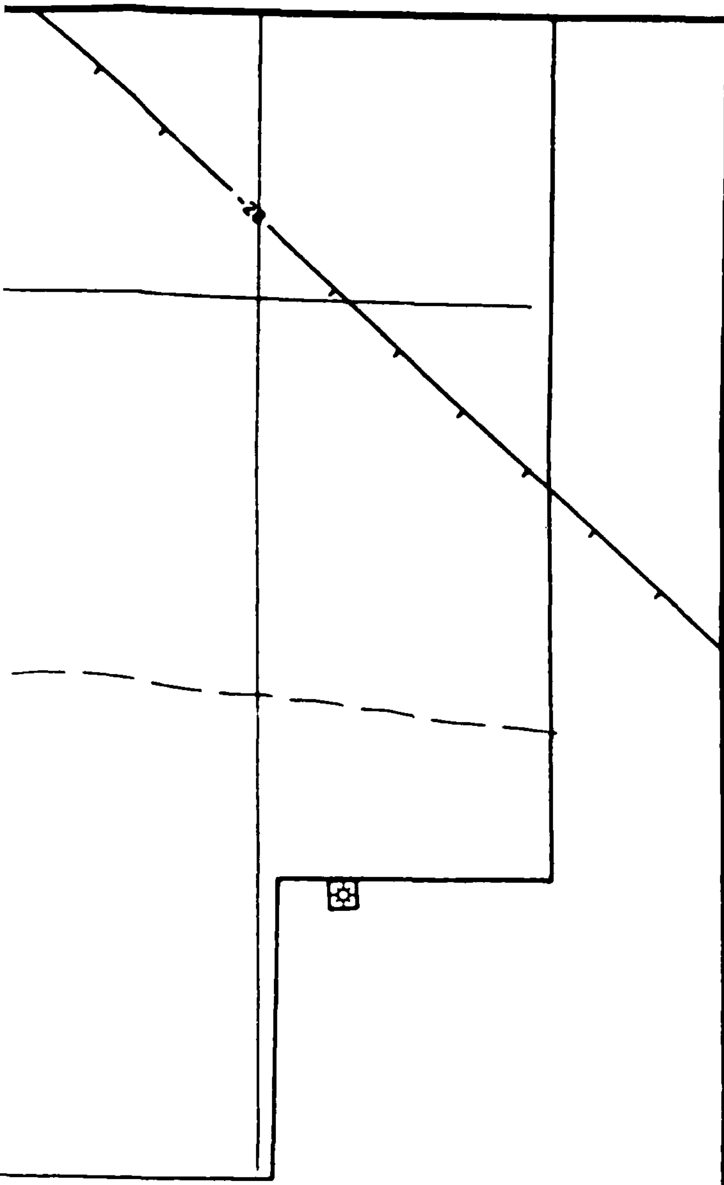


PLATE 5.

AREA D - MIDDLE MONITORING ZONE
POTENTIOMETRIC SURFACE MAP
FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

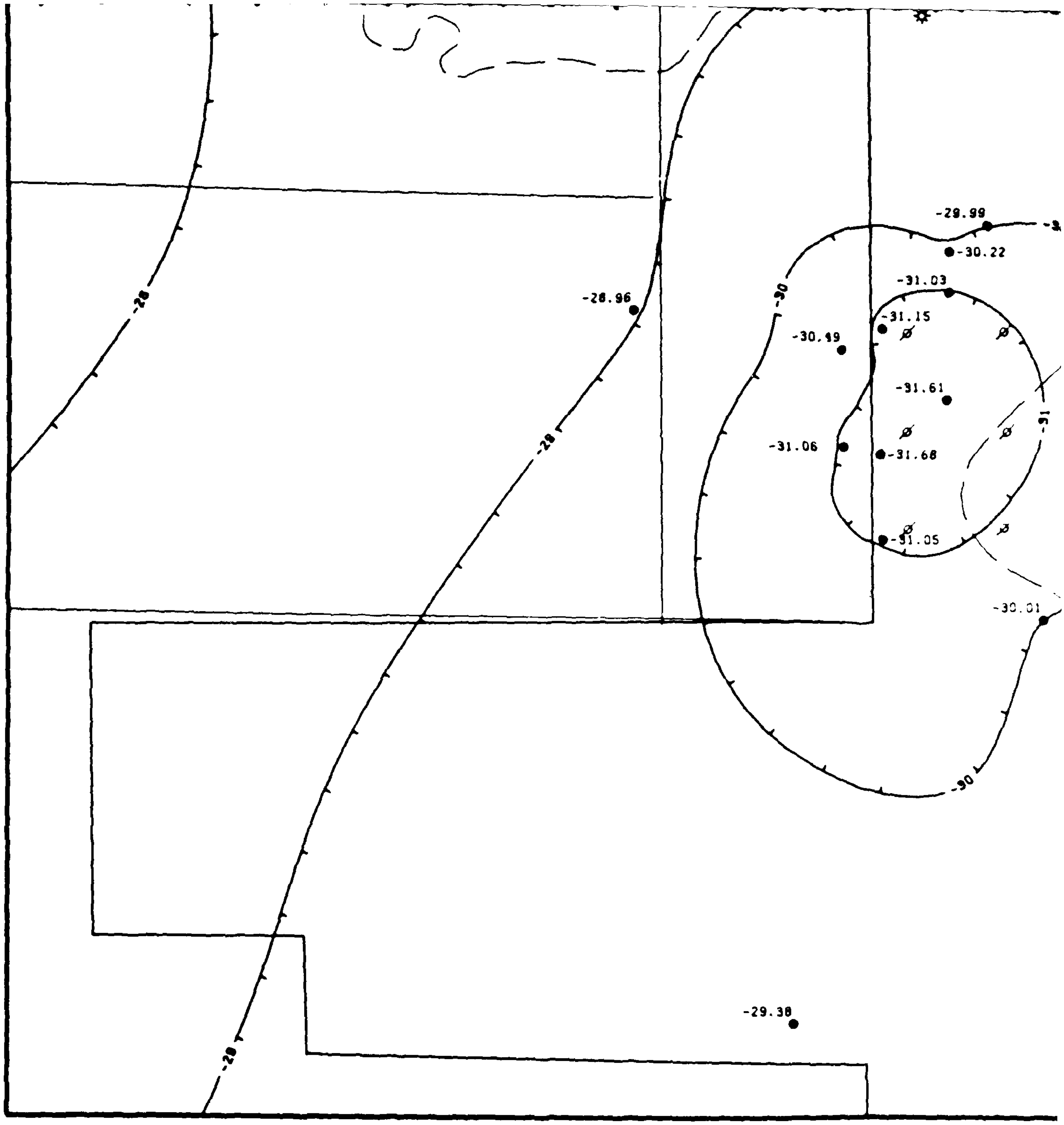
LEGEND:

- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT MSL)
- MIDDLE ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

0 200 400
SCALE IN FEET

GENERATED BY	Vivian Gaddie	DATE:	7-14-88
PEER REVIEW	Deana A Stanley	DATE:	7/14/88
PROJECT REVIEW	Tyler P. Thompson	DATE:	7/14/88



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-28.96
-28
-28
-29.99
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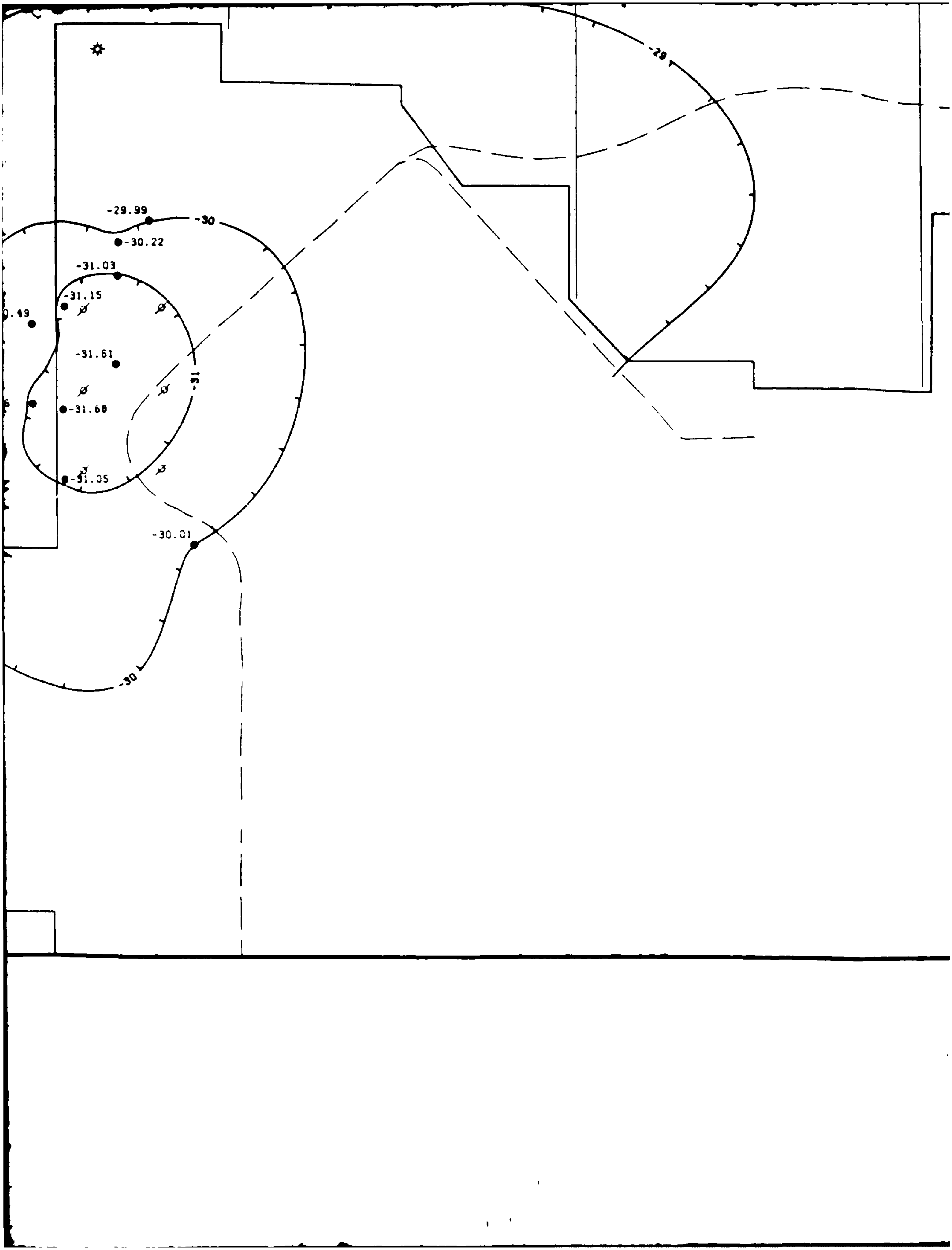
-29.38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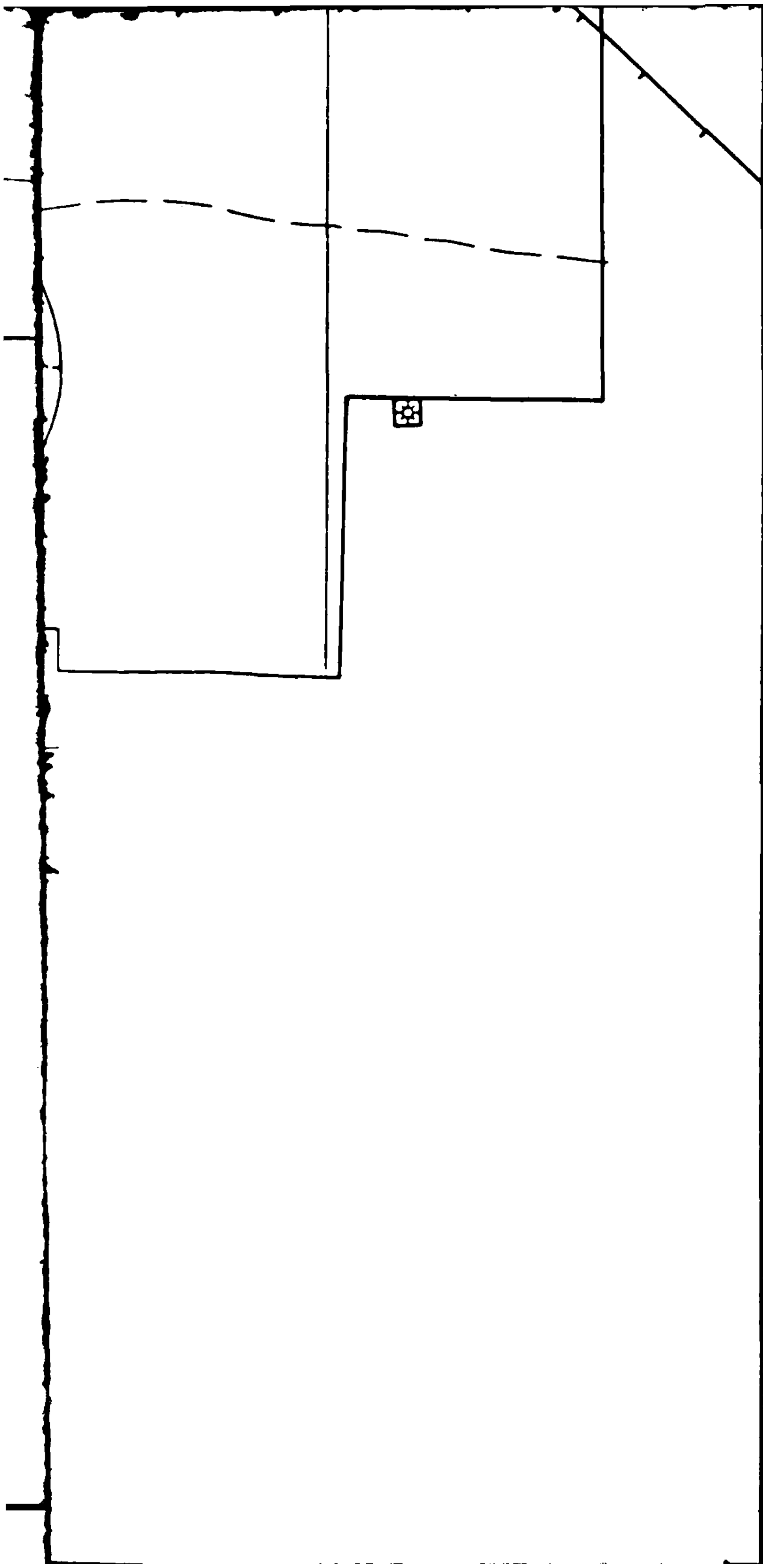


PLATE 5.
AREA D - MIDDLE MONITORING ZONE POTENTIOMETRIC SURFACE MAP FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

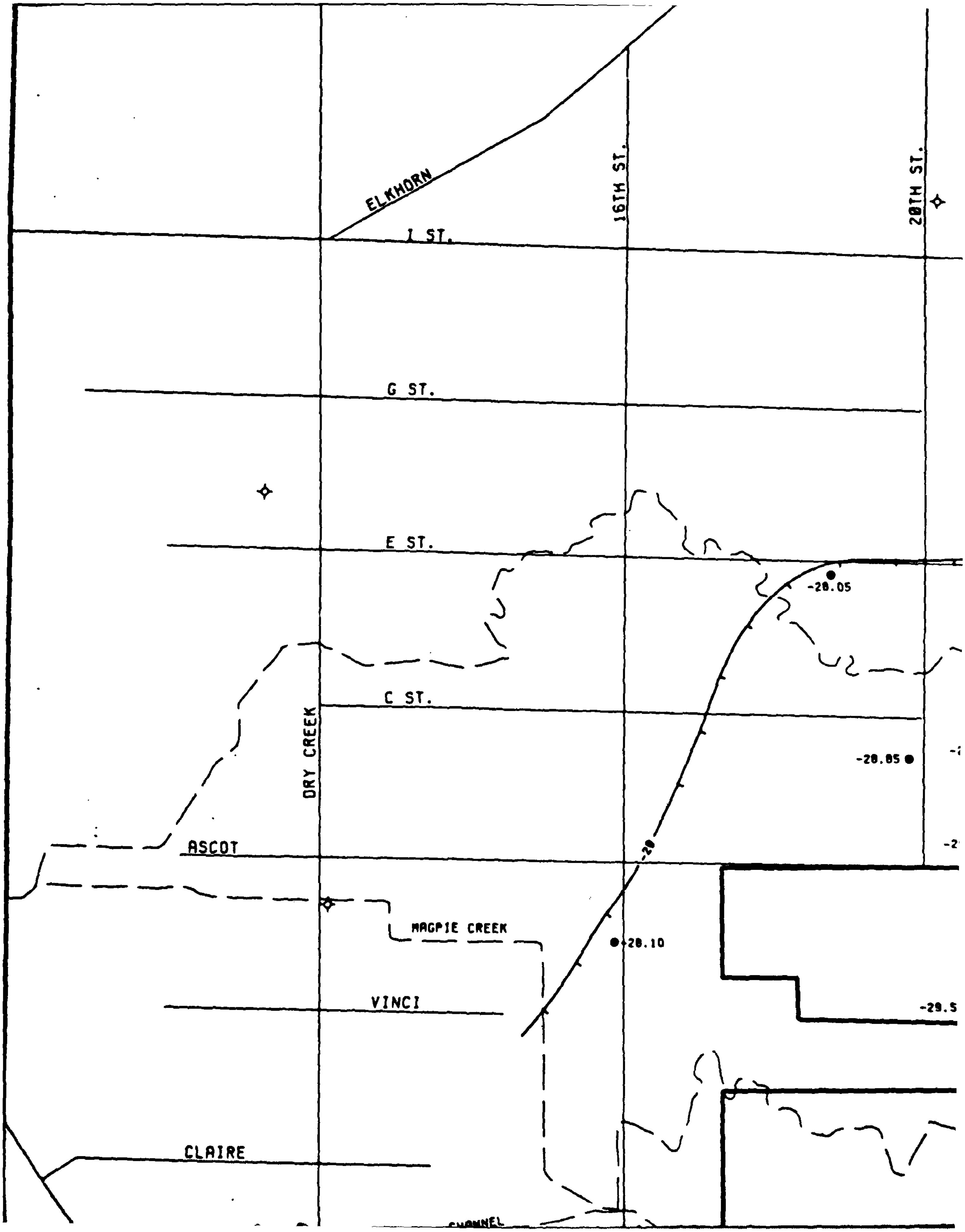
- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 — POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT. MSL)
- MIDDLE ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

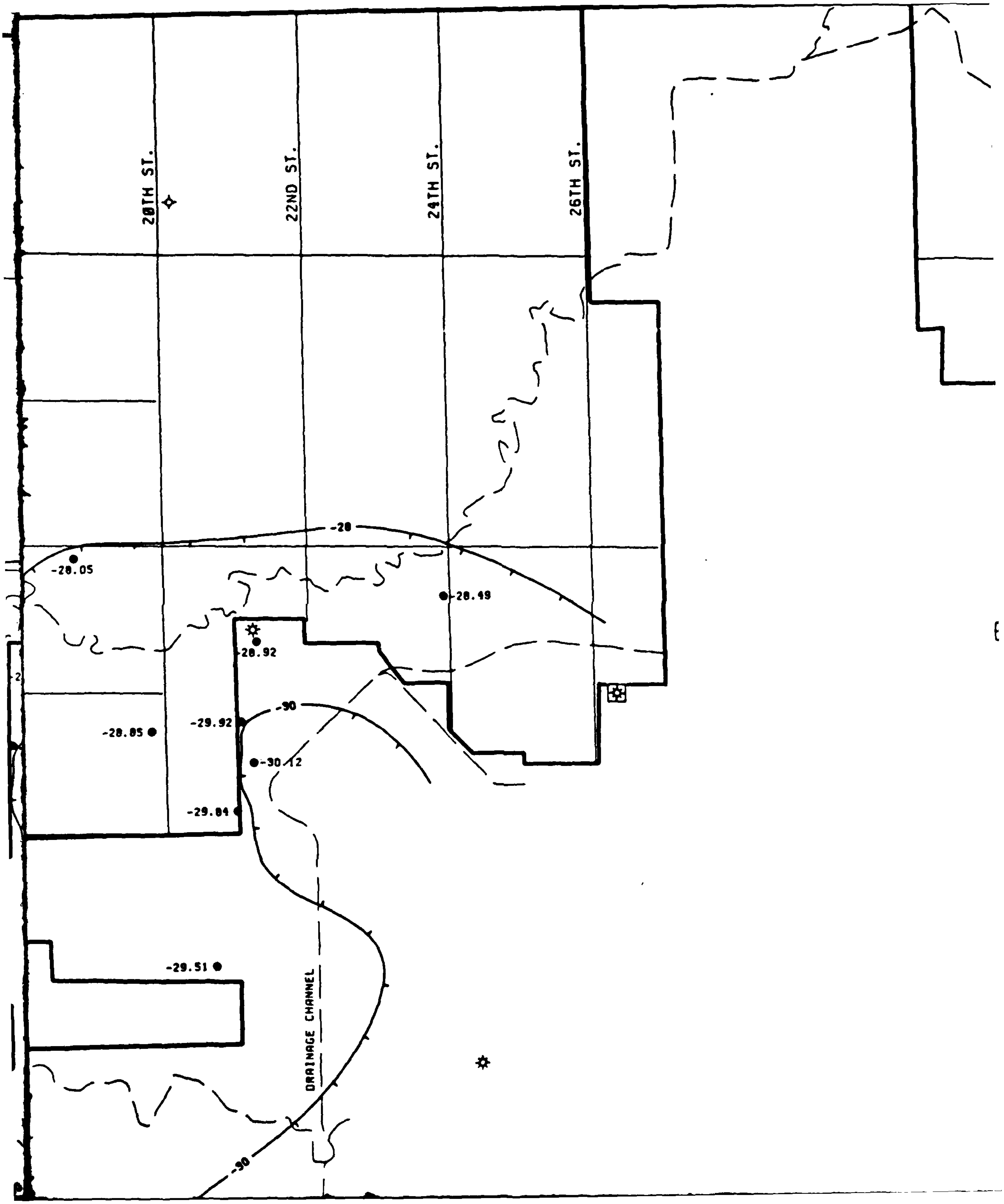
0 200 400
SCALE IN FEET

GENERATED BY Curan Gaddie DATE: 7-14-88
PEER REVIEW Deena A Stanley DATE: 7/14/88
PROJECT REVIEW Taylor P. Thompson DATE: 7/14/88

RADIAN CORPORATION



ELKHORN
I ST.
16TH ST.
20TH ST.
G ST.
E ST.
-20.05
C ST.
DRY CREEK
-20.05
-20
ASCOT
MAGPIE CREEK
20.10
VINCI
-29.5
CLAIRE



20TH ST.
22ND ST.
24TH ST.
26TH ST.
-28
-28.05
-28.49
-28.92
-28.85
-29.92
-30
-30.12
-29.84
-29.51
DRAINAGE CHANNEL
-30

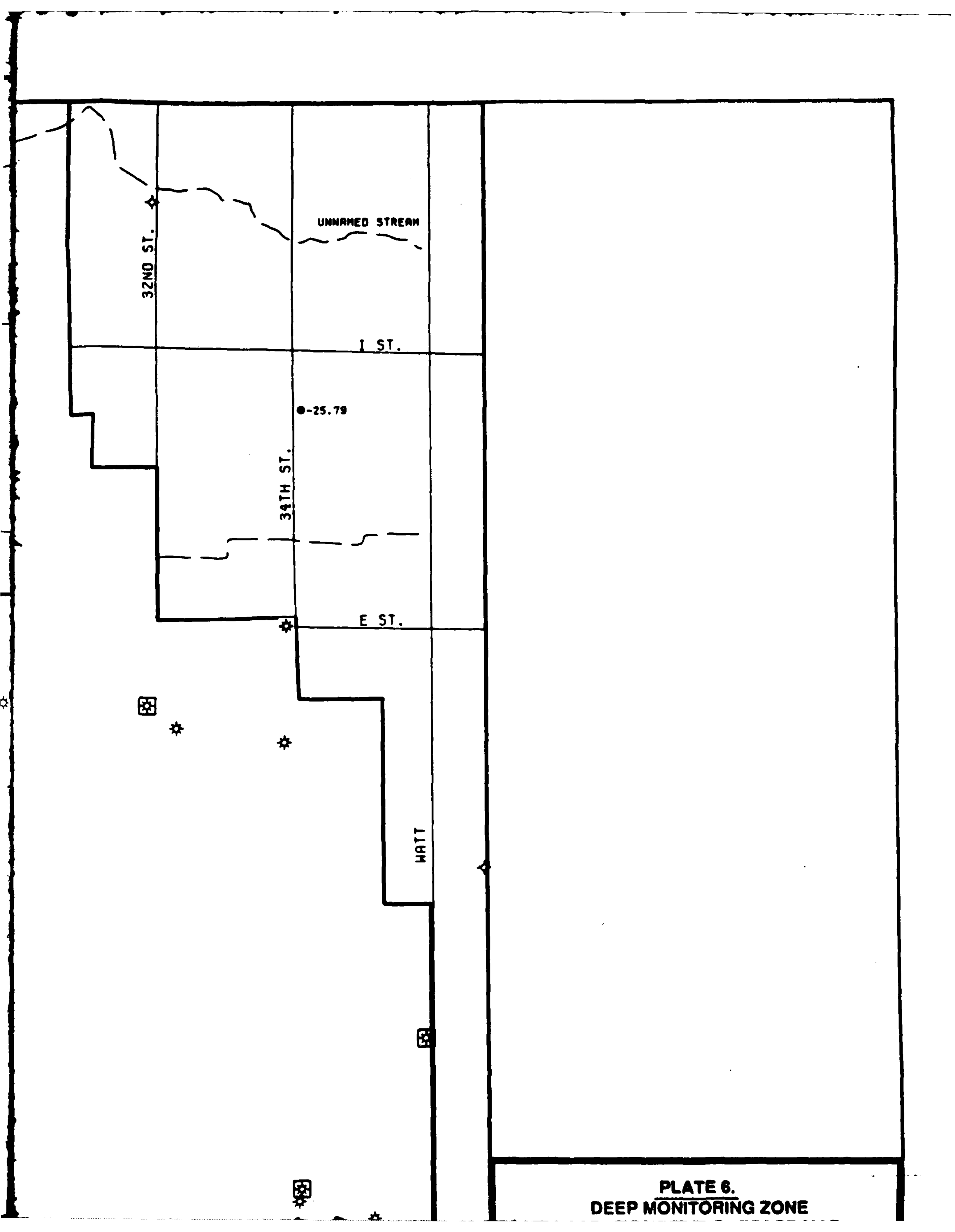
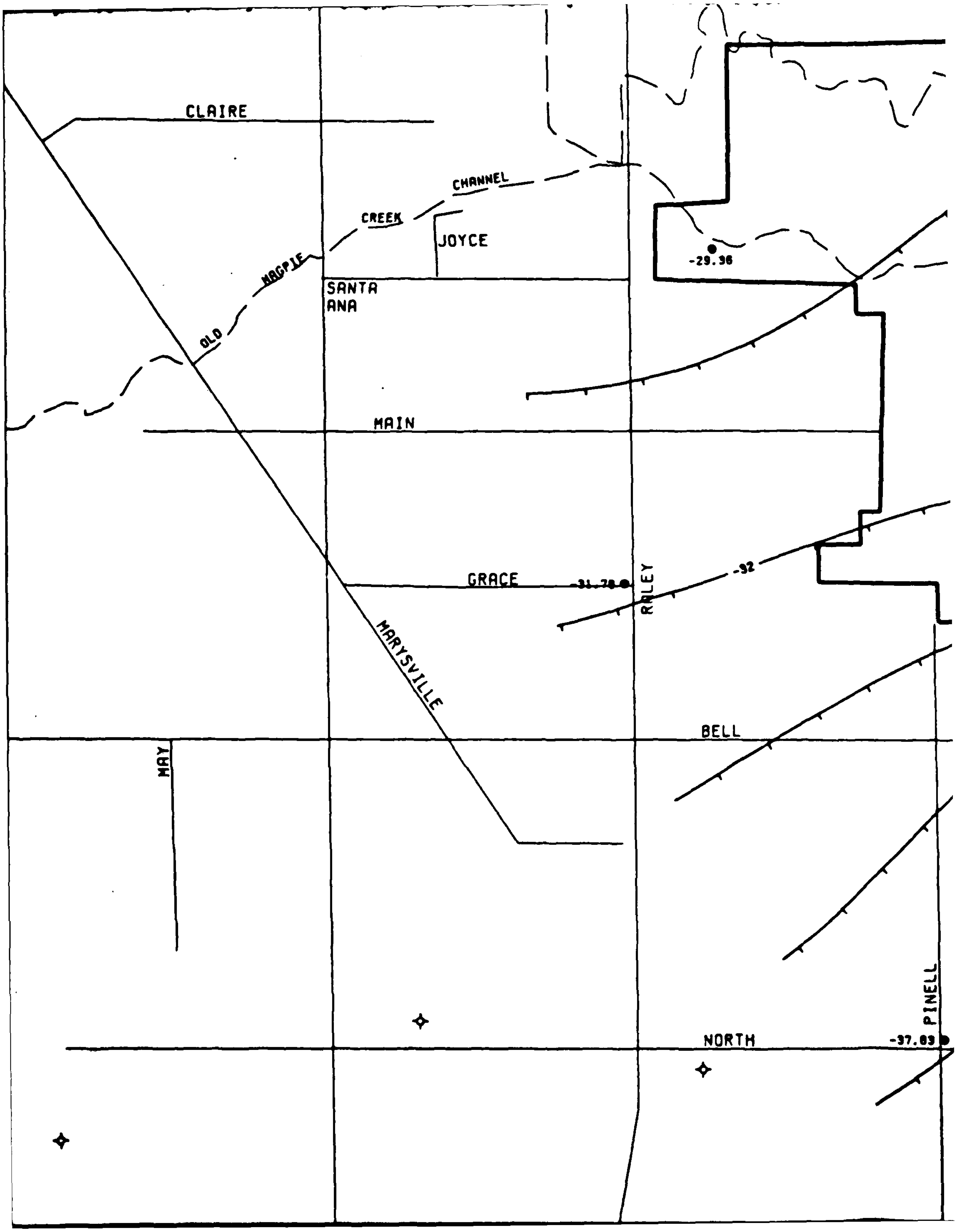
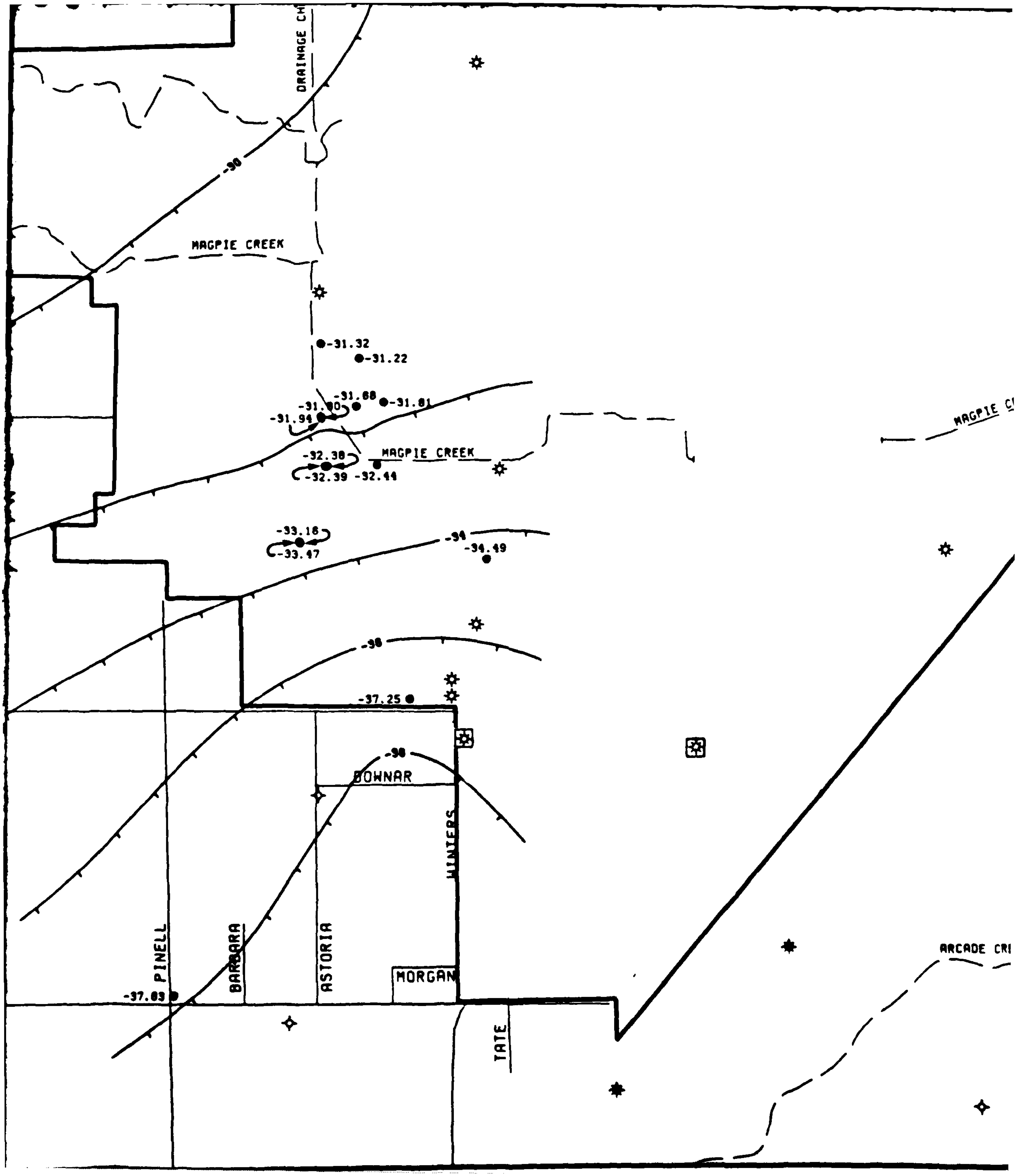


PLATE 6.
DEEP MONITORING ZONE


CLAIRE
CHANNEL
CREEK
MAGPIE
OLD
JOYCE
-29.36
SANTA
ANA
MAIN
GRACE
-31.78
RALEY
-32
MARYSVILLE
BELL
MAY
PINELL
NORTH
-37.83



DRAINAGE CH
-30
MAGPIE CREEK
-31.32
-31.22
-31.88
-31.90
-31.81
-31.94
-32.38
MAGPIE CREEK
-32.39
-32.44
MAGPIE C
-33.16
-33.47
-34
-34.49
-36
-37.25
-38
BOWNAR
WINTERS
PINELL
BARBARA
ASTORIA
MORGAN
-37.83
TATE
ARCADE CR

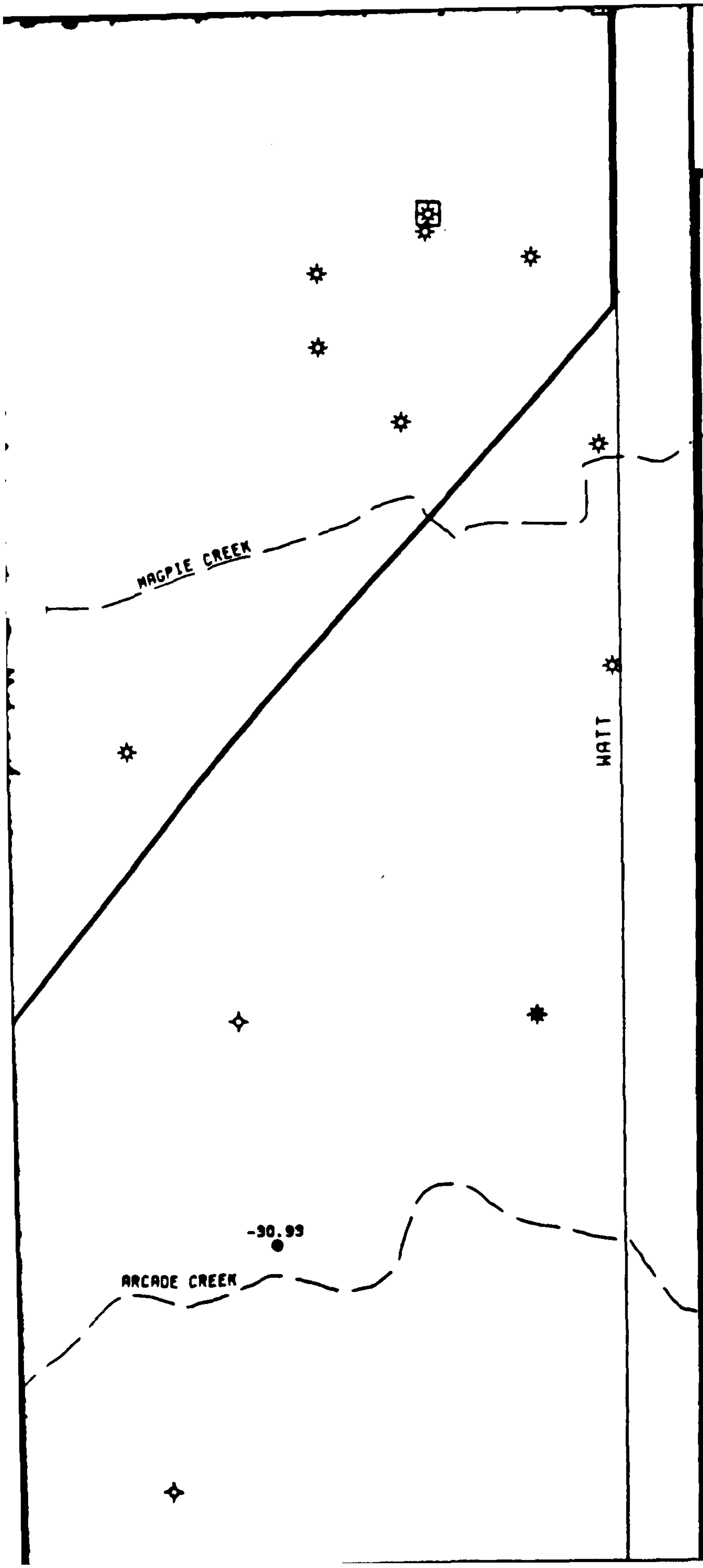


PLATE 6.

DEEP MONITORING ZONE POTENTIOMETRIC SURFACE MAP FOR DATA COLLECTED MAR. 1 - 2, 1988

McCLELLAN AFB
Semiannual Informal Technical Report
SEPTEMBER 1988

LEGEND:

- McCLELLAN AFB BOUNDARY
- STREAMS
- 30 — POTENTIOMETRIC CONTOUR LINE AND ELEVATION (FT. MSL)
- DEEP ZONE MONITORING WELL
- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- CITY WELL
- CALTRANS WELL
- EXTRACTION WELL

N

0 500 1000
SCALE IN FEET

GENERATED BY: Vivian Gaddie	DATE: 7-14-88
PEER REVIEW: Deena A Stanley	DATE: 7/14/88
PROJECT REVIEW: [illegible]	DATE: 7/14/88

RADIAN CORPORATION